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TRANSACTIONS OF THE

SECTION ON

Preventive Medicine and Public Health

of the
American Medical Association
at the Sixty-Sixth Annual
Session, held at San Francisco,
June 22 to 25, 1915

AMERICAN MEDICAL ASSOCIATION PRESS
CHICAGO: NINETEEN HUNDRED AND FIFTEEN

ISSUED
FEB 17 1936
M. L. W.

Reprinted from
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AMERICAN MEDICAL ASSOCIATION

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BOSTON
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MEDICAL

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LIST OF OFFICERS

Those named below have served as officers in this section. This branch of the practice of medicine has been included with other subjects in the earlier years, as will be seen by the headings which denote the different names given to the section. The names of the officers have been taken from the published records, which are deficient in some cases. It will be appreciated if any additional data are brought to the attention of the Secretary of the American Medical Association.

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BOSTON
1936
MEDICAL

PROCEEDINGS OF THE SECTION

TUESDAY, JUNE 22—AFTERNOON

The meeting was called to order by the temporary chairman, Dr. W. C. Rucker, Washington, D. C.

Dr. A. F. Gillihan, Oakland, Calif., was elected delegate to the House of Delegates.

Dr. W. C. Rucker delivered an address of welcome.

Dr. William B. Wherry, Cincinnati, read a paper on "A Plaguelike Disease of California Rodents, Affecting Man." Discussed by Drs. G. W. McCoy, Honolulu, T. H.; N. S. Wayson, San Francisco; Nathan Barlow, Cuyamel, S. Honduras, and William B. Wherry, Cincinnati.

On motion of Dr. M. P. Ravenel, Columbia, Mo., seconded by Dr. B. Franklin Royer, Harrisburg, Pa., the following resolution was adopted and presented to the House of Delegates:

WHEREAS, The American Association of Medical Milk Commissions through its nine years of existence has fostered the establishment of some eighty medical milk commissions by county medical societies; and,

WHEREAS, These milk commissions, now an activity of our organizations the county medical societies, have uniformly crystallized public sentiment in favor of pure milk, and indirectly, through public interest in the same, have been able to bring about better health administration; therefore be it

Resolved, That the House of Delegates recommend this activity to county societies, and to this end the Council on Health and Public Instruction issue a bulletin on the "Organization and Purpose of Medical Milk Commissions."

Dr. John W. Kerr, Washington, D. C., read a paper on "The Full-Time Health Officer." Discussed by Drs. James A. Hayne, Columbia, S. C.; A. F. Gillihan, Oakland, Calif.; Adelaide Brown, Sacramento, Calif.; J. N. Force, Berkeley, Calif.; William Simpson, San José, Calif.; M. P. Ravenel, Columbia, Mo.; B. Franklin Royer, Harrisburg, Pa.; T. D. Tuttle, Seattle; Otto P. Geier, Cincinnati; O. B. Nesbit, Gary, Ind., and J. W. Kerr, Washington, D. C.

On motion of Dr. Otto P. Geier, duly seconded, a resolution was carried that a committee of three, of which Dr. John W. Kerr be chairman, be appointed by the temporary chairman to draft a resolution, to be presented to the House of Delegates, calling on the Council on Health and Public Instruction to include in its propaganda the advocacy of the full-time health officer.

The temporary chairman appointed as a committee on resolutions Drs. John W. Kerr, A. F. Gillihan and Otto P. Geier; and as a committee on nomination of officers, Drs. William Simpson, San José, Calif.; N. K. Foster, Oakland, Calif., and B. Franklin Royer, Harrisburg, Pa.

Thursday, June 24—Morning

The report of the Committee on Nominations, which was adopted, was as follows: Chairman, Dr. William C. Rucker, Washington, D. C.; Vice President, Dr. James Adams Hayne, Columbia, S. C.; Secretary, Dr. Otto P. Geier, Cincinnati; Delegate, Dr. Eugene R. Kelly, Seattle.

The following papers were read as a Symposium on Industrial Sanitation:

Dr. Otto P. Geier, Cincinnati: "Introductory Remarks: Industrial Sanitation—The New Factor in Public Health."

Dr. Sidney Morrill McCurdy, Youngstown, Ohio: "Physical Examination of Employees."

Dr. William F. Snow, New York: "Occupations and the Venereal Diseases."

Dr. B. S. Warren, Washington, D. C.: "Sickness Insurance."

These four papers were discussed by Mr. Frederick L. Hoffman, Newark, N. J.; Drs. G. M. Kober, Washington, D. C.; R. W. Corwin, Pueblo, Colo.; G. H. Richardson, San Francisco; G. H. Taubles, San Francisco; W. C. Rucker, Washington, D. C.; Leo Munter, San Francisco; G. H. Chamberlain, Jr., New York; Mary Lawson Neff, Des Moines, Ia.; Otto P. Geier, Cincinnati; S. M. McCurdy, Youngstown, Ohio; William F. Snow, New York, and John W. Kerr, Washington, D. C.

A motion was duly carried that the chairman appoint a committee on Industrial Sanitation, to report to the section at its next meeting.

Thursday, June 24—Afternoon

Mr. Sherman C. Kingsley, Chicago, read a paper on "Some Medical Aspects of the Open-Air School." Discussed by Drs. B. Franklin Royer, Harrisburg, Pa.; N. K. Foster, Oakland, Calif.; F. E. Corey, Alhambra, Calif.; Heman Spalding, Chicago; B. F. Howard, Sacramento, Calif.; L. M. Powers, Los Angeles; Otto P. Geier, Cincinnati, and Mr. Sherman C. Kingsley, Chicago.

Dr. William C. Hassler, San Francisco, read a paper on "The Administration and Control of Communicable Diseases by a City Health Department." Discussed by Drs. Jackson Temple, Santa Rosa, Calif.; W. C. Rucker, Washington, D. C., and W. C. Hassler, San Francisco.

Dr. George W. McCoy, Honolulu, read a paper on "The Favorable Influence of Glucose on the Growth of Acid-Fasts." Discussed by Drs. C. C. Bass, New Orleans; W. C. Hassler, San Francisco, and George W. McCoy, Honolulu.

Dr. W. C. Rucker, Washington, D. C., read a paper on "The Relation of Rodent Plague to Human Infection." Discussed by Drs. William C. Hassler, San Francisco, and W. C. Rucker, Washington, D. C.

Dr. Anna Wessels Williams, New York, read a paper on "Significance and Prevention of Amebic Infections in Mouths of Children." Discussed by Drs. Woods Hutchinson, New York; C. C. Bass, New Orleans, and Anna Wessels Williams, New York.

The Chairman announced the appointment of Drs. J. W. Kerr (Chairman), Washington, D. C.; Otto P. Geier, Cincinnati, and S. M. McCurdy, Youngstown, Ohio, as a committee on Industrial Sanitation, to make a report at the next meeting.

Dr. B. Franklin Royer, Harrisburg, Pa., read a paper written by himself and Dr. Samuel G. Dixon, Harrisburg, Pa., on "The Sanitary Engineer in Public Health Work" Discussed by Drs. Victor C. Vaughan, Ann Arbor, Mich., and B. F. Royer, Harrisburg, Pa.

A PLAGUE-LIKE DISEASE OF CALIFORNIA GROUND SQUIRRELS AFFECTING MAN IN OHIO

WITH A DEMONSTRATION OF SPECIMENS

W. B. WHERRY, M.D.
CINCINNATI

SUMMARY

Following the discovery of a plague-like disease, due to *B. tularense,* by McCoy and Chapin in California, W. B. Wherry and B. H. Lamb described the occurrence of the same micro-organism in two cases of conjunctivitis in Ohio. Both cases were characterized by ulcerative conjunctivitis involving the palpebral conjunctivae, accompanied by lymphadenitis of the preauricular and cervical glands on the corresponding side, a high temperature and marked prostration.

These patients were under the care of Dr. Derrick T. Vail and Dr. Robert Sattler, respectively, and their clinical courses have been published in the *Ophthalmic Record* (1914) and the *Archives of Ophthalmology* (1915).

In searching for the probable source of infection in these two cases the following points were considered: Both patients were affected with the virus affecting rodents in California; both patients had handled rabbits previous to the onset of the disease; there were numerous rumors that wild rabbits in Ohio, Kentucky and Indiana were dying off in large numbers of some disease. With the kindly cooperation of Dr. J. H. Landis, health officer of Cincinnati, the same disease due to *B. tularense* was discovered in wild rabbits found dead in southeastern Indiana.

The virus (a small encapsulated rod) is extremely difficult to demonstrate and is best stained with anilin Hoffman's violet or gentian violet. It could not be grown on any medium except the coagulated egg-yolk recommended by McCoy and Chapin.

All the esential features of the disease as it occurred in man could be reproduced by placing a little of the virus in the eye of a rabbit or guinea-pig.

Infection also takes place, in rodents, through the gastro-intestinal tract, through the nasal mucous membrane, and, as shown by McCoy and Chapin, squirrel fleas (*Ceratophyllus acutus*) may successfully transfer the virus. As the recent experiments of Dr. Wayson show, the house fly and the stable fly (*Stomoxys calcitrans*) may also transmit the virus shortly after feeding on an infected animal.

It seems likely that this rodent disease is widely distributed and that through the watchfulness of health officers further cases will be discovered.

ABSTRACT OF DISCUSSION

Dr. G. W. McCoy, Honolulu: It is gratifying that what we thought was a problem of purely scientific interest should have turned out to be one of practical importance in preventive medicine. Apparently we have another disease to add to the list of those traced primarily to the lower animal and occasionally transmissible to man. I would like to emphasize that this is an example of a plague-like disease, but one not due to a pest-like bacillus. It is easy to get these things confused. The organism, as Dr. Wherry has said, is in no way similar to the plague bacillus, yet in practically all the animals with which we worked the symptoms and lesions were similar to those of plague. We thought we were fairly familiar with plague, but when the first case of the new infection came under observation we would have fallen into error but for the fact that we insisted on cultural verification of every case. We carried the infection on in animals, and soon found that we were dealing with a disease of rodents other than plague. A great similarity to the lesions of the plague was the most striking point about it. After we had had a great deal of experience with this disease to supplement our experience with plague, we could in a majority of cases differentiate the gross lesions; and of course a microscopic examination would practically always

decide the matter at once, and a cultural investigation would invariably do so. Dr. Wherry spoke of the cultures losing their virulence. We found that to be the case with the cultures from squirrels. I do not recall now whether we had any culture that became entirely avirulent. There is one point of importance about the lesions produced by these avirulent cultures, and that is that they produce in guinea-pigs lesions which are practically indistinguishable from those of tuberculosis. I remember when we first observed these subacute or chronic lesions we thought there had been some error in our technic and that we had introduced tuberculosis. We found that this was not the case. I may say that we always kept in mind in our work the possibility of the occurrence of the plague-like disease in man.

Dr. N. E. Wayson, San Francisco: We have duplicated Dr. McCoy's methods of flea transmission of the disease, but were not so successful as he in our results. Healthy animals separated from those infected by wire netting of the same mesh as mosquito netting, with fleas as the only common carriers, remained well. Our experiments with fly transmission were positive. The stable-fly transmissions were made by allowing the fly, held captive in a vial covered with netting, to bite the infected animal, and transferring it to a normal animal, changing the gauze between bites to prevent possible contact infection of the shaved belly of the normal animal. The stomoxys experiments were successful in a small percentage of cases; but the house-fly experiments yielded nearly 100 per cent. of "takes." The house flies were allowed to feed on, and crawl over, infected viscera, and then crawl over a cocainized eye. This method was positive in transmission, even with a twenty-four-hour interval between the exposure to the infection and to the normal eye.

We have not been successful in transmitting the plague-like disease by the methods of the Indian Plague Commission, in which fleas known to be infected are individually fed, under observation, on normal animals. Our control experiments in plague with this method have also been negative; probably due to an insufficient degree of septicemia in the infected animal used as a host. The same criticism in the plague-like disease experiments will not hold.

Dr. Nathan Barlow, Cuyamel, S. Honduras: During the last fifteen months in Honduras we have frequently had outbreaks of a peculiar disease which resembled climatic bubo, and was reported by me as an epidemic of climatic bubo, but which resembled very closely the disease described by Dr. Wherry, with the exception that there were no conjunctival symptoms. The gland juice from this disease was found by ordinary cultural methods and by ordinary stains to be free from demonstrable micro-organisms, which agrees with the description of climatic bubo; but it seems to me not

impossible that some diseases which are at present classed as climatic bubo may really be infections with the same or a similar organism to that described by Dr. Wherry.

I should also like to bring out the importance of making practitioners in subtropical countries more acquainted with this and all other plague-like diseases, because it has twice happened that my assistants have made the diagnosis of plague, and were ready to bring about measures which would have been sure to quarantine Honduras, and I was able to see the cases before these steps had been taken. By making the proper examinations we were able to demonstrate that the cases were not plague. The serious results of such a mistake would be greater in the case of the Central American countries than in the United States, because the health authorities cannot go so far with the people there as here; and after one such error it is very likely that if true plague were later found, the necessary quarantine measures would be very much delayed.

Dr. William B. Wherry, Cincinnati: I do not see any reason why this virus should not produce other types of disease in man besides conjunctivitis. It seems possible, judging from McCoy and Chapin's work, and our own work on animals, that human beings might be infected by way of the gastro-intestinal tract and through abrasions of the skin. The virus might give rise to some forms of rhinitis, sore throat, and tonsillitis. Those are the possibilities. I am not at all certain that the virus is virulent enough to produce septicemia in man. Unfortunately we did not avail ourselves of the opportunity that we had to test that. We should have drawn off some peripheral blood to see if the virus were circulating or not. In one case we took blood rather late, and the results were negative. It seems that the virulence of the virus is diminished by passage through man. Guinea-pigs inoculated directly from a human being died after six or seven days; and in three or four days when it came from another guinea-pig; so apparently the virulence is slightly diminished for rodents by passage through man.

MEDICAL ASPECTS OF OPEN AIR SCHOOLS

SHERMAN C. KINGSLEY
Director of the Elizabeth McCormick Memorial Fund
CHICAGO

Medical examination of employees is becoming the practice in the industries of our country. This has been found necessary by business men, first, to conserve the health and welfare of the individual, and second, to promote efficiency. Safety first methods and principles are becoming matters of first importance in the life of our country. Shop sanitation and proper working conditions are requisites in a first class business organization.

There are 20,000,000 schoolchildren in the United States. These boys and girls spend 11,415 years in the schoolrooms of the land every school day. This means a total every school year of 2,283,000 years. School attendance is compulsory.

Any business responsible for the expenditure of this amount of time would find it necessary to apply efficiency tests to be sure that working conditions were satisfactory.

Anyone who has visited schoolrooms and is aware of the enormous amount of time required from the boys and girls of the land cannot help wondering how much time is lost through drowsiness, inattention and half asphyxiation due to badly ventilated and overheated schoolrooms. Government in the United States concerns itself with the direction of the individual perhaps less than any other great nation of the world.

The public school affords our one most conspicuous exception to this rule. We compel the boys and girls to go into the schoolhouse and occupy school seats.

We keep each one in the presence of the teacher and under the direction and supervision of the school authorities for a period of six to eight years, at least. Our theory is that each boy or girl reared in the United States should have at least a grammar school education. We now know that less than one-half ever finish the grammar school.

Through the work of our juvenile courts, settlements and vocational guidance bureaus, our children societies and other agents dealing with boys and girls, we are beginning to understand some of the pressing problems of child life.

Health inspection in public schools shows that 12,000,000 of our 20,000,000 schoolchildren have physical defects serious enough to interfere with school progress. Careful study in many cities further shows that from 2 per cent. to 10 per cent. of the total school population has physical defects so serious as to render school experience practically useless and to render it unprofitable to spend public money trying to educate them unless something is done to correct physical defects.

Advocates of the open air school believe that the time to spend time and money on the individual is when he is young and when such effort and expenditure will result in benefits which will accrue to the individual, and not wait until it is necessary to deal with them as chronic invalids or as finished dependents.

Open air school advocates believe that 100 per cent. of the schoolchildren should have their fresh air and hygienic rights. In many parts of the country there is no reason why all schools should not be open air schools all the year around, because the climate affords no serious obstacle.

In other parts of the country, the winter months constitute a problem, but for the major portion of the year, even in the colder latitudes, all schools can have open air conditions. Even in the winter months, open air conditions can be much more nearly approached

through the periodic opening of windows to let in the fresh air.

The debilitated child affords a special problem and, as was said before, it is estimated that from 2 per cent. to 10 per cent. of the schoolchildren are of this type, and this would mean somewhere between 400,000 and 2,000,000 such children in the United States.

The Elizabeth McCormick Memorial Fund of Chicago has made the open air school a special feature of its work. In the school year 1913-1914, there were twenty open air schools in Chicago with an attendance of over 600 children. In the case of 590 of these children, fairly complete records were kept.

The Board of Education furnished teachers and school equipment, and the Municipal Tuberculosis Sanitarium of Chicago cooperated in furnishing nursing service and in providing food.

The Elizabeth McCormick Memorial Fund employed special physicians, furnished clothing and other service necessary to the conduct of the schools. The children selected were of the undernourished, anemic and tuberculous type, and came mainly from the congested districts of Chicago. The average size family represented by the children was 6.15. Average number of rooms 4 plus. There was an average of 1.8 tuberculous members in each family represented by these children. The average rent was a little over $12 per month. The average income in the families represented by the children was $7.02 per individual per month.

This study of income was made in the latter half of the year 1913-1914, when industrial conditions in Chicago were normal. This income is a little more than half the standard established by the Juvenile Court of Chicago as a minimum on which a family of the size represented by these children can live and maintain health and efficiency. The figure set by the Juvenile Court is $12.60 per individual per month for such families.

Seventy-five per cent. of the children were diagnosed as tuberculous, meaning bones, joints, glands, etc.; 20 per cent. were suffering from anemia, and malnutrition; 5 per cent. were suffering from other defects, bronchitis, heart disease, etc. In addition, 188 had diseased tonsils; 165 had adenoids; 466 decayed teeth; 152 defective eyes, and then there were other minor defects. The families of a majority of these children were known to the clinics of the Municipal Tuberculosis Sanitarium. There were many other unclassified defects. In addition to these conditions, hours of retiring, irregular meals, conditions of sanitation and cleanliness in a majority of the homes were unsatisfactory.

First hand acquaintance with these children throws strong light on the reasons why at least some of our children fall out of school at an early age and why they are so illy-prepared physically and mentally for the duties of life. They help us to understand why our general theory of a grammar school education for all the boys and girls reared in this country is not being made effective, and why more than half of them never attain this standard, and why such large numbers leave school with only fourth, fifth and sixth grade preparation.

Advocates of the open air school state that a thorough knowledge of each individual child is necessary and that this knowledge should recognize the child's physical as well as his mental individuality.

In order that careful medical work might be done, the Elizabeth McCormick Memorial Fund, for several years, has paid the physicians in the Chicago open air schools. This enables them to give the amount of time that is necessary adequately to deal with these children. The physicians have spent an average of about four hours a week on each of the nineteen schools. They find that it requires about a half hour to give each child a careful examination, and such examinations are made on admission, discharge, and once or twice during the year.

In addition, there is the daily running supervision which takes care of any special ailments, sees that physical defects are followed up and corrected, that children having elevated temperatures and who are indisposed, should be placed on rest. The nursing service which is furnished by the Municipal Sanitarium takes about an hour and a half a day of the nurse's time for each school. The nurse inspects the children daily, supervising taking of temperatures, taking care of any little injuries or physical needs, and visits the homes and helps to get the best possible cooperation with the school in the child's behalf.

Then there is a small number of children to each teacher. This makes it possible for her to know her children, and when she understands home conditions, physical needs and has the cooperation of nurses, social workers, juvenile court officers and other social forces of the community, she gets an understanding of her children that she perhaps never had before.

To begin with, she is usually chosen for her interest in the work and her general social as well as teaching sense. The children study under open air conditions. They have as much sunshine as possible and their work is made as varied and interesting as conditions will permit.

In some of the schools they have a daily shower bath, daily feeding and a rest period after the midday meal. The aim is to "weave all these features into a process of education and the hygienic way of life." Results are almost uniformly gratifying.

Children gain in weight, they increase in alertness, in spirit and interest and make better intellectual progress.

Improvement is also shown in the hemoglobin tests. The average gain in weight for these children in ten months was 4.95 pounds. This approximates closely what the gains of normal children of the same age and sex should be and is shown in the accompanying tables.

Tables 1 and 2 show that about half the children gain as much (or more) as normal children of the same age and sex, and about half gain a little less.

The open air school movement is spreading rapidly over the country. There is a deep interest in the

TABLE 1.—WEIGHTS (BOYS) IN COMPARISON WITH NORMALS

Age	No. of Boys	Actual Average Gains Per Month	Normal Gains According to		
			Holt	Ch. Bd. Ed.	Boas
7	6	0.37	0.34	0.32	0.35
8	13	0.29	0.47	0.38	0.41
9	21	0.37	0.43	0.43	0.43
10	24	0.41	0.51	0.40	0.48
11	28	0.5	0.45	0.43	0.44
12	18	0.61	0.58	0.59	0.51
13	29	0.7	0.66	0.6	0.65
14	14	0.91	0.85	0.81	0.86
15	9	1.09	0.9	0.91	1.01
16	3	0.52	1.00	0.90	1.13

TABLE 2.—WEIGHTS OF GIRLS IN COMPARISON WITH NORMALS

Age	No. of Girls	Actual Average Gains Per Month	Normal Gains According to		
			Holt	Ch. Bd. Ed.	Boas
7	4	0.24	0.33	0.36	0.35
8	10	0.45	0.38	0.35	0.40
9	27	0.44	0.36	0.39	0.40
10	20	0.44	0.52	0.44	0.45
11	28	0.55	0.5	0.49	0.55
12	33	0.65	0.86	0.65	0.76
13	21	1.02	0.77	0.80	0.83
14	22	0.85	0.71	0.90	0.80
15	4	0.52	0.65	0.74	0.70

physical welfare of schoolchildren, and it is the conviction of part of our people that the time to serve these children is when they are in the public schools; that it is not good business to allow them to sit for six or eight years with handicaps and defects which are preventing them from receiving the thing which the school wants to give.

The following tables show the school progress of these children for their year in the open air school and the previous record of the same children in regular rooms.

TABLE 3.—SCHOOL PROGRESS OF 522 CHILDREN IN CHICAGO OPEN AIR SCHOOLS, SCHOOL YEAR 1913-14

1 child made three grades in this school year.
12 children made two grades this school year.
9 children made one and one-half grades this school year.
387 children made one grade in this school year.
113 children failed to make one grade in this school year.

TABLE 4.—SCHOOL PROGRESS OF 488* OF THESE CHILDREN PRIOR TO SCHOOL YEAR 1913-14 BASED ON THESE FACTS AND ASSUMPTIONS

First—The age and grade of each of the pupils was taken at the beginning of the school year 1913. Second—We assume that according to usual standards each child entered school between 6 and 7 years of age; that he continued in school, and that he should have made one grade each school year.

22	children	averaged	0.50 to	1	year	to a grade.
107	children	averaged		1	year	to a grade.
172	children	averaged	1 to	1.50	years	to a grade.
128	children	averaged	1.50 to	2	years	to a grade.
18	children	averaged	2 to	2.50	years	to a grade.
22	children	averaged	2.50 to	3	years	to a grade.
2	children	averaged		3.50	years	to a grade.
9	children	averaged		4	years	to a grade.
5	children	averaged		5	years	to a grade.
1	child	averaged		6	years	to a grade.
2	children	averaged		7	years	to a grade.

* Nine of the 522 children entered school in the school year 1913-1914; twenty-five had not completed one grade at the end of the school year 1912-1913, and therefore were not included in this table.

New York City has 250 open window classes with the same number of children in each class as in the regular schools, and the promoters say the results are better than in closed rooms.

New York also has twenty-five classes for anemic children and in these classes there are twenty-five children, and here again they say the results are better than when these children go to the usual closed room. There is no feeding or rest period in these classes.

Many other cities have open window classes. In California and many other localities, the movement is spreading rapidly.

For the type of children we have been describing, we believe that something more than merely opening the windows is necessary if these children are to be restored to efficiency and made useful citizens.

In many places the penny lunch or diets of milk and crackers, sandwiches, or other less expensive methods of feeding are in vogue.

We believe that this work should have careful medical direction and supervision.

Children should not be subjected to extremes of temperature unless they are properly provided for it. There is no reason, however, why all the schools in the country should not approach much more nearly the open air schools than at present.

Even in climates where the winter temperature is a problem, windows can be opened at intervals and the rooms flushed with fresh air. The Creator has provided enough fresh air for all and almost any audience room is greatly improved by such frequent opening of windows to let the fresh air in.

One of our little boys in Chicago brought a companion to the school not long ago saying to the physician: "Say, Doctor, how sick has a feller got to be to get in this 'ere school?" The open air school advocates believe in giving all debilitated children in our schools the care and attention which will give promise of making them useful citizens, but they also believe that people should not necessarily be sick or debilitated in order to have their fresh air and hygienic rights accorded to them.

ABSTRACT OF DISCUSSION

Dr. B. Franklin Royer, Harrisburg, Pa.: We are indebted to Mr. Kingsley for placing before us in a perfectly sane and rational way some of the problems of school life, particularly the class of pupils requiring open air schools. Some of you may have been a little surprised to hear him make the statement that from 2 to 10 per cent. of schoolchildren require some form of special school care; and yet in many sections of the country the percentage runs even higher. In Pennsylvania we do medical inspection of schools perhaps

on a larger scale than any other state. It is compulsory in districts of the first and second class; optional in districts of the third and fourth class. In fourth class districts the work is done by the State Department of Health. We have recently finished making an inspection of 468,000 rural schoolchildren; and in that group we found 70 per cent. defective, and 27 per cent. had defects of vision as shown by the crude test with Snellen's chart. Many of them would have shown other defects of vision had we been able to carry out more elaborate tests. What I more particularly want to relate, however, and it bears directly on the subject under discussion at present, is what we have recently observed in certain schools in the little coal town of Nanticoke, with a population of 8,000. Dr. Waters, the city medical inspector, in examining 365 pupils in the isolated eighth ward of that city, found a large number of the children having tuberculosis. He stood aside ninety-nine children in a school of 365 as probably having tuberculosis, and urged open air treatment. The physicians in the town made uncomplimentary remarks; the school board and local health board thought he was unduly radical and made diagnoses without proper information at hand, and suggested that he come to the state health department and ask us to make a confirmatory examination. We sent for this work Dr. Karl Schaffle, chief of our dispensaries, and Dr. Charles H. Miner, two of our best medical men, with large experience in examining tuberculous children. Nurses were sent along. A room was set aside where we might make physical examinations of chests of all suspicious children. To our surprise, out of a group of 120 children examined with great care, including the ninety-nine set aside by Dr. Waters, forty of them gave enough evidence of active tuberculosis to justify a diagnosis of this disease, and sixty were set aside as children who should undoubtedly have been in an open air school. That gave us a percentage of 17. Mr. Kingsley has put it at from 2 to 10 per cent. We have not attempted to work out the percentage in the better types of schools and in communities where well-to-do people live and better housing conditions obtain. However, Mr. Kingsley is certainly well within the limits for most communities.

In Nanticoke the school board was quite willing to cooperate, and immediately converted this entire school into an open window school, and are now planning to isolate in an open air school and teach separately those believed to be actively tuberculous, and to continue the great number of suspicious children in the open window rooms of the school now in operation.

The Department of Health has undertaken to correct conditions through the housing bureau, and has put enough pressure on the coal companies to make provision for build-

ing new houses outside the congested district, and we hope in this way to thin out and apportion to proper space the various families that are there, and eventually to do a great deal toward overcoming present conditions.

DR. WILLIAM C. HASSLER, San Francisco: I would like to ask Mr. Kingsley and Dr. Royer whether in their sections they met with such opposition as the League for Medical Freedom, who object to the investigation of conditions in the home, and particularly among the schoolchildren?

DR. ROYER: School medical inspection was made compulsory in certain districts in Pennsylvania in 1911. No opposition appeared in these districts. The League for Medical Freedom, however, circularized every school board in districts of the third and fourth class, some 2,500 boards, where inspection was optional. A lot of them (1,500 districts of the fourth class) voted against inspection the first year. We took no note of the opposition and inspected in the districts where they refrained from voting against it. The next year half as many districts voted against inspection, even with the league's agitation continuing. The school boards have come around, fewer voting against it each year, and we are now inspecting practically everywhere. Their attack has been a complete failure. We have not opposed them at any time, and every blow they have struck has been a boost and has done us good.

DR. N. K. FOSTER, Oakland, Calif.: I spend all my time as director of health in the Oakland schools. Five years ago I induced the board of education to build an open air school. It was in the yard of one of the larger schools, and it was decidedly open air. The east side was entirely open and the south and west sides had open louvers clear across, so there was never a lack of air. We filled this school by picking out all the worst defective children we could find in the large school, about twenty-three I think. At the beginning of school in August we weighed the children in both schools carefully and at Christmas time we weighed them again carefully. The children in the open air school had done the same work as those in the other school. We had not, as Mr. Kingsley speaks of their doing in Chicago, given them food or rest. The only difference was in the air. The children from the open air room had every one gained in weight and they showed a relative gain of 55 per cent. over the children from the inside. Their mental advance had been equally good, all of them being promoted although many had failed before when they were inside. Several of them even made two grades. Special teachers have often remarked to me how bright and wide-awake these children always are, in great contrast to those in the inside schools. There cannot be any question that we are stifling and destroying the vitality of many of our children by shutting them up in close, stuffy

schoolrooms. The result of this in Oakland has been that we have from fifty to 100 new rooms, and every one of those rooms can be open air; that is, they are built in units so that the air comes in from two sides; the one side is fixed with windows that can be opened entirely, and on the other side windows can be opened so that there can be a cross draught. I think that the ventilating engineers with their wonderful schemes and ventilating machines are doing more damage to the schoolchildren than almost any other people—pumping in devitalized, dead air that has lost its invigorating qualities for them to breathe, keeping it at an even temperature without any disturbing currents, making many of the children in our schools stupid. I hope the time will come, and I hope the medical profession will let this strike deep into their hearts, that if we want to take any step to make our people strong and vigorous and well, it must be through open air schools.

Dr. F. E. Corey, Alhambra, Calif.: I have constantly asked our people, if the schoolchildren can be made better and restored to health by putting them in open air schools, why should we continue to keep the well children in closed schools. I have asked the school authorities in my community why they persist in building closed school houses when we know and have heard so much of the benefit of open schools, expending vast amounts of money to build architectural monuments to endanger the health of the rising generation. I believe that the mechanically ventilated school, just alluded to, is a menace to the health of future generations, and we ought to bring to bear all the influence we possibly can to defeat it. I have seen some such buildings, and they have distressed me beyond measure, and I cannot express too emphatically my disapproval and my desire that this matter may be agitated all over the country until we get some light into the minds of our school authorities. That is where the trouble seems to be.

Dr. Heman Spalding, Chicago: As to the question raised here about the opposition to school inspection, in Chicago we began the examinations without saying anything about it to anybody; just proceeded, and everybody wanted their children to be examined—almost everybody. Occasionally somebody would say he would not have his child examined. We said, "Very well. We don't want to examine him. Don't bother us. Just take care of your own child"; and we continued that way for some time. Then the League for Medical Freedom began to oppose somewhat, and through some means or other—I do not know what—we threw down physical examinations for a year. Then we began again, but at the present time physical examinations are made only of such children as come with a signed certificate from the parents giving consent. We get a pretty large percentage in that

way—enough to keep our men busy all the time—and will continue in that way for the present. We have no law in the state of Illinois requiring physical examinations of pupils as they have in Pennsylvania. We are trying to get such a law. I do not have the figures to give. Mr. Kingsley has given his figures, but our figures are not available as yet to give you the details and results of our examinations.

DR. B. F. HOWARD, Sacramento, Calif.: It has been well pointed out that the open air school is an important factor in the prevention of tuberculosis. I wish that some one might give us a definition of an open air school. We have all kinds of schools, from the country school with the cracks between the boards, to the city school with a goodly number of windows. I think with the open air school, or any school, we need, perhaps, quite as much what we might call an open air school teacher. I have been in a great many schools that could really be called open air schools if the windows were only properly opened, and that is particularly so here in California. We have all the facilities in the way of climate for conducting open air schools for all of our children; and yet one goes into schools where the windows are closed, most of the time. I would like to have in connection with this definition of the open air school some recipe for producing an open air school teacher.

DR. L. M. POWERS, Los Angeles: May I ask, Dr. Foster, if you have come to any definite conclusion which is better, for the boards of education or the health department to have control of the school inspection? I agree thoroughly with the doctor in reference to ventilation. I have been through all of that.

DR. FOSTER: That is a question that would bring up a great deal of discussion. It does not matter whether the board of education or the health department handle it, so long as it is handled. It is merely a matter of private opinion whether the one or the other do it.

DR. THOMAS D. MAHER, San Francisco: We have in San Francisco between fifteen and twenty open air schools, or cold air schoolrooms, and we also have one class of physically defective children, children who have been for some years under the observation of the Associated Charities; and we have in prospect, I am glad to say, an open air class for pretuberculous and tuberculous children. That is what we have in prospect for the coming year, and I am sure that we will find in the public schools many children not only suffering from tuberculosis, but pretuberculous children with enlarged lymphatic glands, and cases of that character. We have in California no mandatory laws compelling any school inspection. We are going along and meeting with only sporadic opposition.

Dr. Otto P. Geier, Cincinnati: Two queries suggest themselves to me as the result of hearing this paper. First, if the open air school does so much for the tuberculous child and for the pretuberculous child, why should we not at once take the next rational step and make all of our schools open air schools? Why should we wait until we find by physical examination that a child is pretuberculous before we begin to use this remedial agency, fresh air? I think we all go through the cycle. My attention in Cincinnati was first called to the open air school in connection with the tuberculosis hospital, and later on we got busy with our open air school to treat pretuberculous children; and I believe one of these days we will have to come to the proposition of treating everybody as pretuberculous and give them all open air treatment.

The doctors seem to fail singularly with a thing they are working with all the time, and that is the open air hospital. We have just finished building a $4,000,000 hospital, and we have done the usual thing—put some porches on it, and roof gardens; but the expense of removing patients to inadequate porches and the expense of moving up to the roof garden is prohibitive. I believe that when that hospital builder finally arises who has the courage to turn the hospital inside out and put the inside on the outside, and just a few dozen rooms on the inside so that they may be cared for, then we will make some progress in our hospitals.

Mr. Sherman C. Kingsley, Chicago: I entirely agree with the point of view mentioned here two or three times, namely, that all children should have fresh air and plenty of it.

The ideal of open air school advocates is fresh air and hygienic rights for 100 per cent. of schoolchildren. I do not pretend to know the truth about ventilation. Many scientific studies are now in progress. The scientific experts, so far, do not seem to agree even among themselves. What we understand now concerning the ventilating system in vogue is that windows and doors must be kept shut. Not long ago it was almost equal to separation from the service for a teacher to violate this rule. It is a question whether we protect anything but the ventilating system. My own belief is that whether you have a ventilating system or not, or whether you keep the windows closed and keep the air moving by mechanical process, sending it through the pneumatic laundry to be washed and returned, no matter what the process, I believe that the teacher and the children themselves will be benefited by frequent opening of the windows and letting in some of the air which is always in abundance on the outside of our buildings.

Over and over again, even in so-called ideally ventilated rooms in new buildings, I have seen adult audiences revive, freshen up and regain the look of human intelligence on the

opening of windows. They freshen like a wilted garden after a shower.

It seems to me that some kind of mechanical device should be helpful in getting air into the inside of large buildings where there are inner rooms, corridors and recesses. There are days when the air is stagnant and does not move without some provocation. However, I feel that ventilating systems ought to be used and made to serve, and not venerated and worshiped. Air has qualities, not motives and impulses. We sometimes act as though it would be accommodating and do the thing which is expected of it, just because we expect it.

It is my belief, as I said before, that the efficiency of every school building in the land will be greatly increased by the periodical opening of windows and letting in the air. I believe that both teachers and pupils should be taught to open windows rather than to close them and to feel that opening them was something they never ought to do. We know that we all feel better in the open air. All you need to do to convince yourself, is to look at the children when they gather in the schoolroom on September 1 and then look at them again in June. The open air and outdoor life that they get in the two months keeps them going for the other ten.

SIGNIFICANCE AND PREVENTION OF AMEBIC INFECTIONS IN THE MOUTHS OF CHILDREN *

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From time to time during more than half a century, a protozoan genus called *Ameba* by some, and *Endameba* or *Entameba* by others, has been reported as occurring chiefly about the gum margins in the oral cavity of human beings.

Few details of the morphology, comparative incidence and pathogenicity of the members of this genus have been given. Until last year, most, if not all of the species, were thought to be nonpathogenic. Indeed, of so little worth were they considered that no mention of their presence is made in the general histologic review of parasitic amebas of man by several authors, who used the term "parasitic amebas" as synonymous with "intestinal amebas."

Thus Craig says:

> There is no experimental evidence connecting *Ent. buccalis* (or the mouth ameba) with disease. It is very doubtful if it has anything to do with caries of the teeth, although it is most frequently encountered in the cavities of carious teeth. However, it may be frequently demonstrated in material scraped from the roots of perfectly normal teeth, so that, as far as the evidence goes, we must regard *Ent. buccalis* as only a secondary invader. The amebae known

* From the Bureau of Laboratories, Department of Health, New York City.

as *Ent. gingivalis,* Gross, 1849, and *Ent. dentalis,* Grassi, 1879, are probably identical with *Ent. buccalis* and do not merit separate description.

In 1914, Smith and Barrett, followed by Bass and Johns and several other investigators, asserted that mouth amebas occurred chiefly in cases of pyorrhea alveolaris or Riggs' disease, and that they were the probable cause of this common septic infection of the jaws. Other observers have not agreed with this assertion because sufficient evidence has not been given by its authors to make us sure of the types of amebas found and of the extent, if any, of their pathogenic action. So several hypotheses may be formulated as to the part thought to be played by amebas in mouth infections.

HYPOTHESES IN REGARD TO ACTION OF AMEBAS IN HUMAN MOUTHS

1. Amebas are accidental invaders; they produce no pathogenic or other reaction in the mouth (Provazek Hartman and others).

2. Amebas in the mouth have a beneficent action as scavengers (Chiavaro and others).

3. Amebas may be sometimes pathogenic, producing or helping to produce certain cases of pyorrhea alveolaris, certain abscesses and certain other mouth infections (Leidy, Gross, Flexner, Smith and Barrett and others).

4. Amebas are the specific cause of pyorrhea alveolaris (Bass and Johns and others).

5. Amebas may be pathogenic only in connection with certain other micro-organisms.

The comparative worth of these hypotheses may be discussed as follows:

In favor of the first hypothesis, that is, that amebas are accidental, nonpathogenic invaders, are the facts that amebas have been reported so frequently in apparently normal mouths and that when found in diseased conditions, they are always accompanied by other

micro-organisms of pathogenic types, which might be sufficient to produce the disease. Against it is the fact that they are found so much more frequently and in so much larger numbers in the lesions.

As for the second hypothesis, that amebas are beneficent scavengers, there is no question but that amebas are scavengers both of other micro-organisms and of tissue host cells — at least, of leukocytes, red blood cells and broken down epithelial cells. But they probably take up as many harmless as well as harmful germs and leave enough of the latter to exert their full power in harming the tissues of the host. Then, too, since we know that certain amebas will live on brain, liver and kidney cells of human beings, there is no *a priori* reason to suppose that the mouth amebas will not help in destroying the fixed tissue cells in the mouth, especially after a certain amount of injury has been done them by other micro-organisms. The evidence, then, is against this second hypothesis as it stands.

As regards the third hypothesis, that amebas are sometimes pathogenic, we can only say that the large number of amebas in most cases of pyorrhea and in some abscesses of the jaw, and their infrequent presence in absolutely healthy mouths make this a tenable hypothesis.

We may state, concerning the fourth hypothesis, that is, that amebas are the specific cause of pyorrhea alveolaris, that whether or not they are the specific cause of this condition can only be determined after further study. Some facts brought forward in this paper bring new evidence on this point.

In regard to the last hypothesis, that is, that amebas may be pathogenic only in connection with certain other micro-organisms, we must remember that if amebas absorb and digest fixed tissues as well as leukocytes, blood cells and other wandering cells, they may help decidedly in keeping up a lesion bacteria have started. This fifth hypothesis is also tenable.

ORIGINAL WORK

In order to help determine which, if any, of these hypotheses is correct, we have been trying to find out, first, how many children are infected and at what age the amebas begin to appear in their mouths, as well as to study the condition of the mouths showing the amebas. Second, what types of amebas, if more than one, are present. Third, the relation, if any, of these amebas to the diseased condition of the childrens' mouths, and fourth, the necessity and worth of preventive measures.

We have begun our study by examining the mouths of the schoolchildren in one of the poorer districts of New York City. We have already started the examination of a similar group in one of the more well-to-do districts.

At the same time, the Bureau of Laboratories of the New York City Health Department has begun a more general study of focal mouth infections, particularly of pyorrhea alveolaris.

Soon after our observations on adults were begun, we found that all patients presented to us by the several dentists who are collaborating with us already had pus pockets formed in the jaw alveoli — that is, they were well-established cases — and when we began to inquire for beginning cases, we learned that the diagnosis of pyorrhea alveolaris is made by most dentists only after pus pockets can be demonstrated, so this added interest to our decision to hunt for beginnings in schoolchildren.

So far 1,678 children (those in only one session of the school) between the ages of 5 and 15 years have had a preliminary examination, and from 995 representative ones stained smears have been made and examined for amebas. The 1,678 children have been divided roughly into those having healthy gums and those with receding or spongy and bleeding gums. The healthy looking gums are further divided into those

with one or more decayed teeth, and those with apparently sound teeth. Needless to say, we found very few of the latter, that is, of those with apparently healthy gums and sound teeth, and about one half of all showed unhealthy gums.

From many cases, two smears were taken. The smears were made as follows: In the bad cases, the teeth and gums were cleaned with a cotton swab dipped in 50 per cent. alcohol; then with the flat end of a hard wood sterile toothpick, material was scraped from the margin of the gums (there were no pus pockets in these children, so we did not need a scaler) and stroked lightly over a clean glass slide, three or four streaks being made. The smear was then fixed while still moist by dropping methyl alcohol on it, and it was ready to send to the laboratory. This was called the superficial smear. A second toothpick was used to get material from beneath the margin of the gums, from which another smear was made and fixed. This was called the deep smear. In the cases with clean teeth and tight healthy looking gums, the first smear was made before the cleaning with alcohol. All of these smears were stained with Giemsa's stain and examined for amebas. Other stains have also been used in the more minute study of types of amebas. In regard to the identification of amebas by stained films, we would say that they are more certainly and easily identified by this method than by warm living preparations, though, of course, both methods should be used in studying all of the characteristics of these microorganisms. In hunting for amebas in these smears, we have found that most of them seem to be between the superficial bacterial layer and the deep leukocytic layer, so one may find them only in large numbers in one small part of a smear, especially in a smear taken in a routine way.

Stained by Giemsa, the delicately but definitely reticulated cytoplasm of the ameba stains a clear blue, while the small nucleus shows as a delicate rounded

or irregular mass of red granules and threads, with often a central light blue staining karysome which sometimes contains a vacuole-like body. This nucleus no doubt corresponds to that most frequently described for *Endameba histolytica-tetragena.* There has been found no marked variation from this type of nucleus.

Amebas are so notoriously variable in their entire morphology, according to their stage of development, and to the conditions of growth, that no definite opinion should be expressed as to the species of the forms found in these mouths until much further study has been made. We may say, however, that there seem to be at least two morphologic types of amebas present: one small, with more or less rounded, dense nucleus, with a few or no inclusions or vacuoles, found in the majority of healthy mouths, and the other large, with more irregular nucleus with many large vacuoles and containing many red blood cells, leukocytes and other dense masses formed by undigested material. The latter type is found in the majority of unhealthy mouths. Its appearance agrees with that of the type most frequently seen in the well-developed cases of pyorrhea alveolaris. We have seen no cysts. We have seen evidence of budding and of more equal division.

We have found that amebas begin to appear at a very early age, 35 per cent. of children between 5 and 7 years of age being infected. The numbers of those infected with amebas increase in frequency with age. Between 5 and 15 years, 60 per cent. show these protozoa on their gum margins. In apparently normal mouths, only 29 per cent. show amebas. Taking the percentages by groups as in the accompanying table, the results are more significant.

Finding the amebas so often in apparently healthy mouths and in such young children does not agree with the statement of Bass and Barrett that they are not found in healthy mouths. Whether or not one or more varieties are taken from adult pyorrhea patients and

are simply waiting their opportunity to exert a pathogenic action, we cannot yet say. But the evidence seems to point toward the establishment of either the first or the fifth hypothesis already given.

These results, however, as they stand, are very striking, especially when we must add that most of the cases of spongy and bleeding gums show more amebas in the films than the other cases. If we could only rule out other micro-organisms, the evidence for the pathogenic action of the amebas would be stronger.

NUMBER AND PERCENTAGE OF AMEBAS FOUND IN EACH GROUP OF CHILDREN

Condition of Mouth	Between 5 and 16 Years		Between 5 and 7 Years	
	Total	Amebas Present	Total	Amebas Present
1. Healthy gums	(+ 38) (— 92)	= 29 per cent.	(+ 3) (— 31)	= 9 per cent.
2. Healthy gums, decayed teeth	(+109) (—183)	= 37 per cent.	(+ 32) (—105)	= 23 per cent.
3. Tartar and receding gums	(+182) (— 96)	= 65 per cent.	(+ 19) (— 17)	= 53 per cent.
4. Spongy, bleeding gums	(+268) (— 28)	= 91 per cent.	(+ 34) (— 5)	= 70 per cent.

We have, in these schoolchildren carriers of amebas, a marked opportunity to test the prophylactic effect of ipecac or its emetin alkaloid on mouth amebas.

We have divided the cases showing amebas into three groups, one to be watched without treatment, and others to be treated in different ways, one with emetin and the other by ordinary cleanliness. We have a tooth wash made up containing a dilution of emetin, and have the washing of the teeth done morning and afternoon in the school clinic under the supervision of the school nurse.

The first examinations, one week after the beginning of this treatment, gave marked results, in that every child but one, receiving emetin, showed no amebas,

while many of the others showed them. In the later examinations, however, amebas were found in a few of the emetin-treated which were negative before, while a few more of the controls showed none.

The following points have been brought out so far by these examinations:

Amebas are demonstrated irregularly in all mouths once showing them, most constantly and in largest numbers in mouths showing gingivitis, least so in healthy mouths.

With ordinary teeth cleansing methods, the number of mouths showing amebas is reduced one half. With emetin in the tooth wash, the number showing amebas is greatly reduced, only about 10 per cent. showing them. The second set of controls — those doing their cleaning *at home* by ordinary methods — continue to show amebas in about 75 per cent. of the cases.

The question as to the amount of emetin to be used has not yet been settled. We began with a 1 : 200 solution, then reduced it to a 1 : 400 strength. Probably a much smaller amount would be sufficient to keep down the development of the amebas.

We hope to carry on these investigations for several years and, if necessary, to extend the number of children included in the groups. Whether or not we can demonstrate fully the efficiency of the use of an amebacide in preventing many cases of pyorrhea alveolaris remains to be seen. We hope by combining these practical investigations with the laboratory studies that we may be able to help demonstrate the relationship of these amebas in septic mouth infections.

ABSTRACT OF DISCUSSION

Dr. Woods Hutchinson, New York: It is an interesting and important subject, especially in view of the effect of the organisms involved in later life. My impression is that we shall find that the diseases of the gums in later life bear the same relation to the infections of childhood that the diseases of so-called middle age do to the infectious diseases of younger life. We elderly individuals, who ought to be

Oslerized probably, are beginning to be terribly worried about diseases that attack us over 50. By taking proper steps we may very early remove the cause of our worries.

The ameba in its relations with the pathogenic organisms may prove to be the keynote of the diseases and loss of teeth at an immature and undesirable time.

Dr. C. C. Bass, New Orleans: I do not know of any other series of cases as large as that reported by Dr. Williams. Most examinations that have been reported and come to my attention have been in older people, practically all of whom were infected. The study, then, of Dr. Williams and her associates is especially valuable because it takes up the subject of the disease at a stage at which it could be prevented, perhaps, whenever we know enough about it, or cured before too great damage is done. As to the pathogenicity of the amebas that we find in the mouth and in pyorrhea lesions, the evidence at hand leaves the question somewhat open. Many good authorities are confident that this ameba is not the cause of pyorrhea and does not play a part at all. Others are willing to grant that it may play a part. Still others, including ourselves, feel certain that the chief specific cause of alveolodental pyorrhea is *Endameba buccalis.* One of the things that we have observed we believe as certainly as any other thing is that these endamebas feed on certain nucleated cells that are to be found only in inflamed tissue. If we make sections of the diseased tissue we find these same cells distributed not only on the surface, but actually in the inflamed tissue. Now for endamebas to get these cells, they must crawl about or burrow about in the inflamed tissue searching for them. We have been able to demonstrate and find the endamebas in the tissue and determine to what extent they burrow. We find that they burrow for a distance many times their diameter, but possibly they don't burrow as deeply as the endamebas in amebic ulcers of the intestine do. Not only do we find them in the tissue, but we find them also on the surface of the closed ulcerated tissue in the bottom of the pyorrhea pocket. In burrowing back and forth from the pyorrhea pocket and then into the tissue, many different species of bacteria are transported or transplanted and retransplanted by the amebas. Whether endamebas are present in all cases of pyorrhea we will be obliged to wait for further studies to determine until those working on the subject have acquired such technic as will permit them to make accurate negative diagnoses. It is quite difficult to make an examination which justifies one in saying positively that the individual has not some endamebas present. We may say he has no endamebas demonstrable by our technic, but a microscopic lesion may be large enough to hold many endamebas. We cannot look at an individual's mouth, simply a casual macro-

scopic observation, and determine that there is no inflammation of peridental membrane around or between any of his teeth. In fact, the disease does not begin around the teeth; it begins between the teeth, where it cannot be seen. After it is advanced, then we may see evidence of the disease labially or lingually. It is difficult if not impossible to determine that an individual has a normal mouth. The fact that some endamebas have been found and are found in what are called apparently normal mouths cannot be taken too seriously on this account. Our experience has been that in the examination of probably 500 individuals having pyorrhea, we found endemebas in all of the patients after we had acquired the technic which seems to us quite necessary.

Dr. Anna W. Williams, New York: Just such work as Drs. Bass and Johns are doing in histologic biology will no doubt be of much aid in helping us to get more evidence in regard to the relationship of this organism to disease. In regard to the use of the toothpick, I would say that we simply use a toothpick in our routine examinations of the schoolchildren. These children do not need a scaler since they do not have pus pockets. We have only found one of the older boys having small pus pockets. We use Young's dental scaler No. 22 for obtaining material from the adult pyorrhea cases that we have studied.

THE SANITARY ENGINEER IN PUBLIC HEALTH WORK

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Commissioner of Health, Commonwealth of Pennsylvania
AND
B. FRANKLIN ROYER, M.D.
Chief Medical Inspector
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For efficiency, a public health organization in a representative form of government should, in our opinion, be directed by one versed in sanitary and practical medicine as well as in sanitary engineering. A little training in entomology and geology would add to the efficiency of the executive. He should be clothed with great police powers. The foundation of the organization should be a statistical division, including vital, morbidity and marriage statistics. Cooperating and depending on this statistical division, a medical division should be established, headed by a medical chief with an experience of at least ten years in general and special hospital work and in epidemiology. The medical associates should be those fitted for bureau work and for field service throughout the territory over which the department has jurisdiction.

Independent of the responsibilities generally recognized as belonging to a medical division, it is essential for the best work to have a system of hospitals for communicable diseases. In connection with the department there should be a corps of sanitary engineers and a well-equipped laboratory with workers in pathology, bacteriology and chemistry.

Divisions for tuberculosis sanatoriums, dispensaries and for the distribution of biologic products are necessarily required.

Another important division should be one on housing, headed by a sanitary engineer or a broadly educated medical man.

To promote economy and efficiency in all the other divisions, the department must have a technical purchasing and bookkeeping division.

With the divisions already mentioned it is desirable that there should be one on foodstuffs and drugs, including, of course, milk hygiene, and all these should be accompanied by a division of education and publicity, for in a representative form of government the police medical laws cannot be readily enforced if they are far in advance of the intelligence of the people. The publications of the division should be both medical and literary, and as important as any is the utilization of the newspapers, as the latter are the only publishing channel that reaches every fireside.

Our personal experience has also impressed us with the great necessity for doing medical school inspection, and, in handling communicable diseases, of having a well disciplined staff of licensed nurses; they may not only teach the children in schools, but also teach the poor in their homes.

With this discussion of the suggested divisions of the organization we can better understand the place of the sanitary engineer in public health work.

The medical division is informed, through the statistical office or division, of the undue prevalence of infectious diseases in any community, such as are transmitted by water, milk or foodstuffs. The sanitary engineer often plays a most important part in overcoming the trouble.

While the medical inspector is analyzing samples of water and milk, and studying the movements of the individual persons who have been ill, and the character of the food supplied to them, the sanitary engineering staff traces the source of these supplies and their ultimate distribution in the infected territory.

The sanitary engineer often definitely locates the source of infection, particularly when the public water supply is at fault. His services may always be employed with advantage in the enforcement of such sanitary reforms as may be required to wipe out the source of danger and in planning for the elimination of further dangers from it. It is only when the engineering department cooperates closely with the various other subdivisions of a public health organization that the executive officer may properly control and combine their efforts, direct their several separate plans of investigation, harmonize their results and do the state's work economically and effectively.

The medical officer and the sanitary engineer must work together in field epidemics, particularly of water-borne disease; let this be direct or indirect. The medical officer takes precedence and reviews with local men both the probable source of infection and obscure cases of the disease. An engineer follows and enforces disinfection procedure as well as abatement of nuisances detrimental to health, and such general sanitary clean-up as may be required. From the coordinated studies of the medical and sanitary engineering services of a department the executive officer naturally draws his inference on which he bases judgment and plans reforms, determines results and anticipates further needs.

Profiting by the strictly medical experience gained in the suppression of epidemics of water-borne disease and the results of bacteriologic research, the sanitary engineer investigates and studies the water supplies of the state generally, and the watersheds of such supplies, for the purpose of protecting and furnishing a potable water to the people and for the purpose of preventing the occurrence of epidemics in large centers of population.

A very large part of the activities of the sanitary engineer in a health organization consists in making those studies for the executive officer that enable him

to pass judgment on the plans of water works and sewerage works which are to be built to serve the various communities of the state. It is from these preliminary investigations by the engineer that the executive officer determines whether the capacity of particular water works or sewerage works is sufficient for present and future needs, and whether such works are planned so as properly to safeguard the health of the public. In studies of this type the engineer has the assistance of the department's laboratory skill and scientific interpretation, in order to enable the executive officer to advise concerning the type of construction and character of the plant most likely to bring about desired purification, or pass final judgment on plans submitted.

Another important activity of the engineer in a health organization is supervision of water and sewage works already in service in order to hold responsible local officials up to the highest degree of efficiency in care and operation of the plant. Just as a chain is no stronger than its weakest link, so is the water plant or sewage plant no safer than the staff of its operators. Proper supervision may prevent disastrous results and in this supervision the engineer constantly needs the laboratory worker associated with him at his elbow.

In Pennsylvania no system of water supplies or sewers and no sewage disposal plant may be constructed or extended unless the plans and specifications therefor are first submitted to the department of health and carefully studied in the field by the sanitary engineering division. The facts thus obtained are carefully reviewed by the chief engineer, who then goes over the entire situation with the commissioner that recommendations may be made to the governor and attorney general for approval.

The sanitary engineer also patrols the watersheds, and in the patrol of the watersheds, seeks out and abates all possible sources of pollution. In the general

work of the medical staff conditions are discovered that require the work of the engineering division.

Coordination is the key-note of the successfully organized public health department and the sanitary engineering division is one strong arm in such an organization. Let us take, for example, the plan of organization worked out in the Commonwealth of Pennsylvania (see chart). You will note in the scheme of organization that the sanitary engineer derives his authority directly from the commissioner of health and reports directly to him; that he is relieved of the details of purchasing his supplies and doing his own bookkeeping; that he works side by side with the medical division and the other important executive divisions of the organization, any branch of which may instantly be called on for aid and cooperative work.

The Pennsylvania Department of Health in the very beginning of its organization conceived the present plan of organization and later worked it out in detail. The commissioner of health has never at any time hesitated to use the engineering division or any other division of the department for the purpose of ferreting out troubles having any bearing on public health.

The need for a sanitary engineer and a well-equipped laboratory has been recognized for many years. Not until ten years ago did Pennsylvania appreciate this necessity and in the organization of her public health forces under the laws of 1905 legal provision was made for the employment by the commissioner of health of such engineering assistance and laboratories as might be necessary to carry on the work of the department.

A division of sanitary engineering was organized. This division has increased in size until now it contains more than 100 trained employees, all giving their entire time to the sanitary details of the health work of Pennsylvania and laboring in conjunction with the medical and other forces of the department.

With a population of over eight millions (8,380,000) and a surface area of nearly 45,000 square miles, Pennsylvania has need for this engineering organization, which I believe is larger than that maintained by any other state.

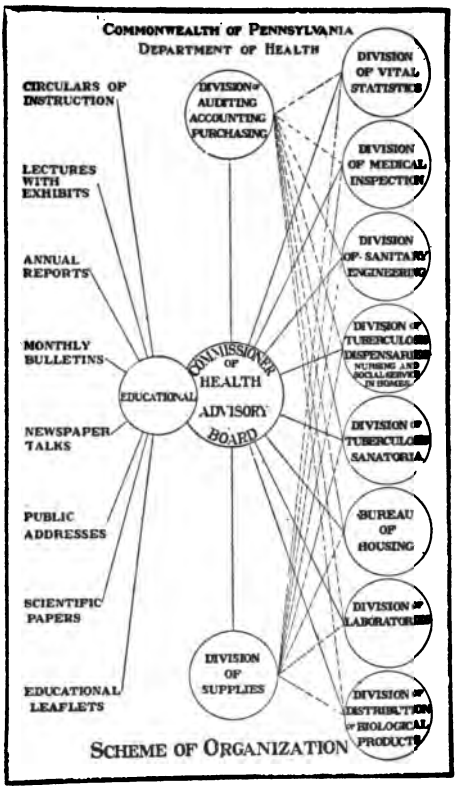
The protection of the purity of the waters of the state is the fundamental work of the engineering division. This is accomplished by preventing the entrance of sewage into the streams and by the purification of water furnished to the public from polluted supplies, or else by requiring that water be obtained from uncontaminated sources.

The importance of this work is self-evident, as an adequate supply of pure water is necessary in every municipality. The urban population of our country is increasing, and with this growth comes a proportionate increase in the amount of water used by each individual. The quantity of water which can be procured from unpolluted sources is generally insufficient for the needs of our modern cities. It follows, therefore, that the large surface streams will be used more and more as sources of public water supply. These streams are usually contaminated and their use would cause an increase in the occurrence of water-borne diseases, such as typhoid fever and bacillary dysentery. While it is true that polluted water can be purified, it is equally true that purification works occasionally fail in their function, and therefore cannot be considered an adequate safeguard. The only sure remedy is to remove the cause and to restore all streams to as cleanly a condition as is practicable by the employment of modern methods of stream protection; in other words, by preventing the discharge of raw sewage into the streams.

A law passed by the general assembly in 1905, entitled "An Act to Preserve the Purity of the Waters of the State for the Protection of the Public Health," furnishes the Pennsylvania Department of Health

with the necessary authority for carrying on this great work. The engineering division bases its operations on the provisions of this law.

This act prohibits the discharge of sewage by persons into any stream or other body of water in the state, and also requires all municipalities desiring to



Scheme of organization of Pennsylvania State Department of Health.

extend existing sewer systems to secure a permit therefore, issued on unanimous agreement of the governor, attorney general and commissioner of health. These permits stipulate such conditions as may be necessary to subserve the general interests of the public health. This law also forbids the construction of water

works for the supply of water to the public, whether by companies or by municipal corporations, unless a written permit shall have first been obtained from the commissioner of health and under such stipulations that the supply may not be prejudicial to public health.

A great deal of study and investigation of an engineering nature is required for carrying out the provisions of this law. The permits issued by the state authorities cannot be arbitrary decisions. They must, to be of value and to carry out the intent of the law, be based on sound engineering judgment. Over 2,000 separate studies and engineering investigations have been made in connection with the administration of this law. From the organization of the department to the present time sewerage conditions have been studied in over 450 separate municipalities and townships in the state, and 940 permits granted as prescribed by law. Every one of these permits was issued after a personal investigation by officers of the department and contains such stipulations as were considered necessary to subserve the general interests of the public health. Two hundred and twenty-five modern comprehensive sewer systems for municipalities and ninety-seven sewage treatment plants have been built under these permits, and many others are about to be constructed. Seven hundred and eighty permits for water works construction have been issued controlling the supply of water to over 700 separate municipalities or townships. Field investigations and studies were also made in each case and the permits included such conditions as were necessary to protect the public.

One hundred and seventeen water filtration plants are in operation supplying purified water under permits from the department of health to municipalities having a total population of over four millions, or approximately 50 per cent. of the entire population of the state.

The department's activities do not cease after a water filtration or sewage treatment plant has been built and placed in operation. Weekly reports covering the details of daily operation of the works are regularly filed with the department of health and these reports are carefully studied by experts, and suggestions for improvements are frequently sent to the different municipalities. In addition, a force of trained engineers is constantly traveling about the state inspecting these plants at irregular intervals. These precautions are taken in order that the public may derive the benefits that can only be secured when the works are efficiently maintained. Their value has been proved many times as the department's representatives frequently find that, due to carelessness or ignorance on the part of the operators, the precautionary measures provided by the designer of the plant and approved by the state have been neglected or entirely forgotten.

The department's attention is directed to the discharge of sewage not only from public systems, but also from individual houses in the townships of the state. A large force of inspectors is engaged on a house to house inspection in the rural districts and especially on the watersheds of the streams used as a source of water supply. Nearly one half of the watershed area of the 28,000 miles of streams in Pennsylvania has been covered in these inspections. In case of pollution of state waters from an overflowing privy or cesspool, from a barnyard, or from kitchen or bath wastes, the inspection seeks to bring about an abatement of the pollution, invoking the aid of the courts, if necessary. The department's aim in this matter is not merely to secure a temporary abatement, but also to require the installation of such apparatus or the adoption of such measures as will cause a permanent abatement of the menace.

During the year 1914 alone, 104,587 properties on 371 different watersheds throughout the state were

inspected. Of this number, 25,300 were in an unsatisfactory condition; 13,107 pollutions were abated on these properties during the year.

From the beginning of the work of the department to the close of the year 1914 a total of 739,437 properties had been inspected or reinspected and 117,168 abatements had been secured through efforts of officers of the department on properties scattered throughout the state. The effect of this work on communities drinking water from streams which previously had been contaminated by these pollutions must be

DEATHS FROM TYPHOID FEVER AND LIVES SAVED
1906 to 1914 inclusive

Year	Typhoid Deaths	Rate per 100,000	Calculated Deaths 1906 Rate Obtaining	Saving as Compared with 1906
1906	3,917	54.8	.....	.....
1907	3,538	48.6	3,989	451
1908	2,450	32.4	4,064	1,614
1909	1,712	22.7	4,140	2,428
1910	1,892	24.6	4,216	2,324
1911	1,716	21.9	4,291	2,575
1912	1,310	16.5	4,367	3,057
1913	1,470	18.1	4,443	2,973
1914	1,075	13.0	4,518	3,443
			Total saved	18,865

counted as one of the factors that has reduced the general death rate and especially the typhoid fever death rate.

The engineering division also aids some of the state institutions of the commonwealth. Most of these have extensive water works and sewerage systems and a number of them have been designed and constructed under the supervision of the engineering division, by means of separate appropriations secured from the legislature for the work. These systems not only protect the health of the patients in the institutions and safeguard the streams below, but they have many times served as models for similar plants for villages and boroughs throughout the state.

A great reduction in the death rate from many diseases has been noticeable in Pennsylvania. The reduction in the typhoid fever death rate, one of the best guides in water purification, has been especially marked, and in the ten-year period since the state department of health was organized has resulted in the saving of thousands of lives to the state.

In 1905, when the department began its operations, Pennsylvania was a typhoid-ridden state. The purification of the water supplies and the improvement in general sanitary conditions have been factors of tremendous influence in bringing about this marvelous reduction in the number of deaths from disease so often water-borne in origin. This combining of work essentially engineering in nature with medical work brings results and proves the value and propriety of utilizing the sanitary engineer in a public health organization.

ABSTRACT OF DISCUSSION

DR. VICTOR C. VAUGHAN, Ann Arbor, Mich.: The work that Dr. Royer has presented as done by the Commissioner of Health of Pennsylvania is a very good thing. Pennsylvania certainly needed to do this kind of work. Western Pennsylvania, as the doctor says, was a hot-bed for typhoid fever; and it was not confined to Pennsylvania but to the whole country. It was not safe for anybody to come into the region around Pittsburgh because of the possibility of getting typhoid fever. I think that many states have found it necessary to make the sanitary engineering department of the state health work very important. I know we have in Michigan. For some years we have had a very competent state sanitary engineer as an official of the State Board of Health and an engineering department; and we have the same rules, the laws that Dr. Royer has got for Pennsylvania. They say that the medical profession is the only profession that buries its mistakes — puts them out of sight. That is quite as true of the engineering profession as it is of the medical profession; and faulty engineering in this country has added greatly to the death list. It has not only added greatly to the death list, but it has increased enormously the expenditure of money. I had a letter only a few weeks ago from the editor of one of the engineering journals wanting me to write an article for that journal showing the advantage it would be to the engineering profession to have engi-

neers examined like physicians are examined. Now understand me — wanted me to write an article showing the great value that it would be to the engineer to have state boards of examiners for engineers, just as the physicians have. I wrote him that state boards of medical examiners were not for the benefit of the medical profession; they were for the benefit of the public; and the same reason would apply to the examination of sanitary engineers. If anybody questions it, simply come to Michigan and travel around with me for a few days. I can show where bungling engineers have buried millions of dollars so that they cannot be resurrected, and at the same time have endangered the lives of, and probably killed, many people. The sanitary engineer is an important and essential adjunct to any health department. The public has the services of the United States, represented here by Dr. Rucker, as recognition of that fact. You cannot do public health work without the sanitary engineer.

Dr. B. Franklin Royer, Harrisburg, Pa.: I am glad that Dr. Vaughan reinforced in a positive way why it is absolutely necessary that engineers' plans for water works and sewage works be submitted to a central health organization for review and approval. It is not only in the interest of the health of the community, but it saves municipalities untold sums of money. Plans may often be submitted by an engineer who is a very good civil engineer but a very bad sanitary engineer, and unless the entire plans are materially changed, would be entirely unfit for the community's public health needs.

PHYSICAL EXAMINATION AND REGENERATION OF EMPLOYEES

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The advantage to be gained by industries in this country entering the field of preventive medicine by means of the physical examination of employees depends on the attitude assumed by medical advisers and the captains of our industrial organizations. That the need for the physical examination of the working force of the world is fundamentally sound, and has an economic and humanitarian basis, has been recognized by the medical profession for years. The fear of a few people, and they are often great molders of public opinion, that some industries may abuse the privilege gained by a knowledge of the physical condition of its workingmen is no ground for the denial of its usefulness to all. Industrial organizations are in business and not philanthropy, and therefore are primarily interested in the increased efficiency and the diminished waste, which are due to preventable accidents and sickness. Industry is also humane and is as distressed at inhumane practices as is the individual. Neither the individual, industry, or, in the last analysis, society can afford any unnecessary loss of productivity, or of diminished efficiency due to reparable and preventable physical defects.

For ages the medical profession has been endeavoring to educate the public in the science of preventive medicine, and the public in turn as it has received the education responded by making new laws for the control of public health. Today we hear, knocking at the door, large aggregations of capital, asking that

they may be admitted to the portals of preventive medicine, and that they may lend their aid toward stamping out the wastes due to preventable accidents and sickness. Just what industries were real pioneers in the work of the physical examination of employees and to what medical men especial credit is due does not seem to be clearly recorded.

Railroads were among the earliest to engage in this work, but with the avowed purpose of eliminating the unfit, and with no provision for physically regenerating them. I recently read in a report of the Colorado Fuel and Iron Company that many years ago Dr. R. W. Corwin examined at frequent intervals those employees who worked in departments likely to be detrimental to health. As the result of an active campaign for the elimination of tuberculosis in Chicago in 1911, many firms under the leadership of Drs. Sachs, Mock, Britton, Fiske, Wieland, Lipman and McClelland examined their employees for tuberculosis, and some time since have extended the work to a complete physical examination.

Dr. Irving W. Clarke of The Norton Co., Worcester, Mass., seems to be a real pioneer, inasmuch as in 1911 he conducted a thorough physical examination of their force and inaugurated a system of repair and subsequent inspection. In Europe, according to the U. S. Bureau of Labor, Statistics Bulletin No. 142, only Belgium and England have departments for the medical inspection of employees and those are poorly developed. Ohio is the only state in the Union that requires a monthly examination of workers, and it is limited to those working in lead.

At the Youngstown Sheet & Tube Co., where I am employed, we have been engaged in this work for sixteen months. We feel it our duty to find the physical defects of our employees, that we may repair them when possible, that we may protect our force from communicable disease, and that we may, in so far as we are able, have our men engaged in work suitable

to their physical condition. Here they can do their work most efficiently and consequently receive a better wage.

In the conduct of the examining department we have used medical graduates who have devoted their whole time to the company's work. Our examiners become familiar with the character of the work done in our various departments, and consequently are better fitted to estimate the relationship between physique and employment. Each person examined is obliged to remove his clothing, and careful arrangements are insisted on to preserve modesty and a professional decorum. The time consumed in a single case varies from ten minutes in the simple ones to as much time as is necessary for the more difficult examinations. All new applicants thus far have been examined, but as our medical force is not yet completed, we have only examined among the old men those returning to work following sickness and injury, and those who work in a department where there might be some likelihood of contracting an occupational disease.

It may be that a little knowledge of the character of our industry will help in judging of some of the results that the accompanying charts show. We employ about 8,000 men, engaged in the work of making iron and steel and many of their finished products. All steel work is known to be very heavy work, often with rather long hours, and associated with hot metals and the problems of high heats. In these plants enter many of the difficulties that railroads have in the handling of freight, since a plant is a veritable network of tracks. Manifestly, we require a different sort of individual to work here than does an industry filled with lighter burdens. This matter has to be daily weighed as we make our physical examinations, and often men must be advised to seek a vocation less arduous.

Our examination consists of taking weight and height with a notation of any identification marks.

Eyes are examined by the Snellen chart to discover defects of vision. All lids are lifted to eliminate the danger of overlooking trachoma. Various simple defects of the eye are noted.

Ears are examined with the watch only, and the distance of hearing noted.

The mouth is explored for defects, such as enlarged tonsils, gumma, new growths, etc., and a physician's description of the condition of the teeth, whether good, fair or bad is made.

The neck is palpated for glandular involvement, and any other signs of disease are noted.

The bared chest is carefully gone over by auscultation, percussion and palpation, with special effort directed toward tuberculosis and heart lesions. Other defects discovered are placed in the record.

The abdomen is palpated.

The inguinal region is recorded as to hernias, inguinal adenitis and other defects.

Penis and scrotum are examined for their local diseases.

Extremities are inspected for old injuries, varicose veins, flat feet, etc., and each applicant has his knee-jerks tested.

Thus far, we have taken the systolic and diastolic blood pressure, a urinary examination on all men over 40, and on all cases believed to have definite heart lesions.

It may be pertinent to bring up the question that is so often asked: "Do not the men object to such an extensive examination?" I will answer by referring to our statistics which show that only four out of 5,624 men submitted for examination refused. In Chart 1 will be found a record of the physical defects that we have found in 5,624 examinations. Many of these defects seem too simple to need attention, but it is our continued effort to remedy the most important and as many others as possible. Teeth usually head

the list, and the neck with its large quota of enlarged cervical glands follows. This condition and its ill effects have been taken seriously by at least one concern, the Goodrich Rubber Company of Akron, Ohio, and they have employed full-time dentists to fix the teeth and instruct in oral hygiene. Their dentist in 100 examinations could find only two patients whose teeth could be classed as fair. Others no doubt, prompted by the excellent work of this company, will found dental departments.

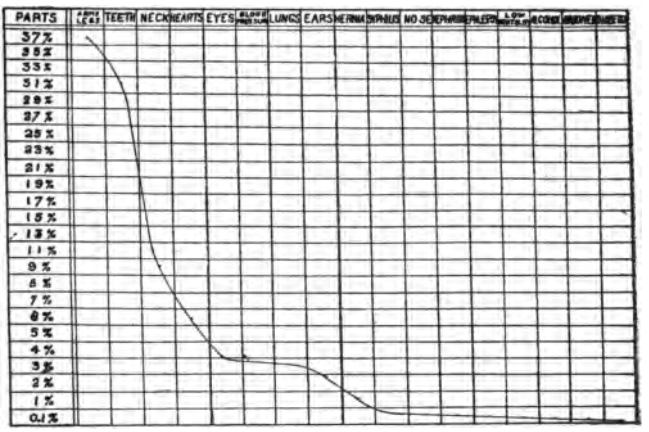

Chart 1.—Distribution of physical defects on medical inspection of 5,620 employees.

The heading Hearts denotes those in which we felt we could demonstrate a definite organic lesion. Eyes include mainly those which were trachomatous and of such deficient vision as to require correction. Blood pressures represent cases that were in systole above 150 mm. or which had an excessive pulse pressure. Ears are only classified according to hearing, regardless of cause. Syphilis refers to those cases that were able to be demonstrated without blood tests, but from history and physical findings.

Our blood pressure findings in men over 40 years were very interesting to us, but from them we do not

feel that we have yet gained any knowledge that will help us in suiting the man with high pressure to any given work. These pressures were all taken in the sitting position and were on men applying for work, many of whom felt physically fit.

DATA FROM EXAMINATIONS

Number of cases	322
Average systolic pressure	147.7 mm.
Average diastolic pressure	90.2 mm.
Average pulse pressure	57.5 mm.
Average age	44.2 yrs.
Albumin in urine found in	23.6 per cent.
Average systolic pressure	163.6 mm.
Average diastolic pressure	95.5 mm.
Average pulse pressure	68.1 mm.
Average age	45.3 yrs.
Albumin and heart lesions in	4.36 per cent.
Average systolic pressure	162.9 mm.
Average diastolic pressure	93.1 mm.
Average pulse pressure	69.8 mm.
Average age	45.3 yrs.

We had hoped that some idea could be determined from the systolic, diastolic and pulse ratio as to whether we could expect albumin and casts in the urine. The albumin and casts seem to be dependent on other factors, for it was not uncommon to find them in low and medium pressures, as well as to find them absent in pressures over 180 mm. Since we realized that the time of existence might be a factor, we have endeavored and succeeded in watching two men at hard labor with pressures of over 200 mm. systolic for six months. These men are two of the best workmen in a gang of many and seem to feel no ill effect from their high pressure. In both of them as yet there has not appeared albumin or casts in the urine.

Chart 3 illustrates the anatomic distribution and the percentage of the causes marked in the surrounding circle that we felt necessitated disqualification. Eyes, one of the largest causes, were those affected

with trachoma, and deficient eyesight that could not be corrected. Men having hernias, without a truss or operation, we do not accept. Heart lesions represented those that were not fully compensated, as evidenced

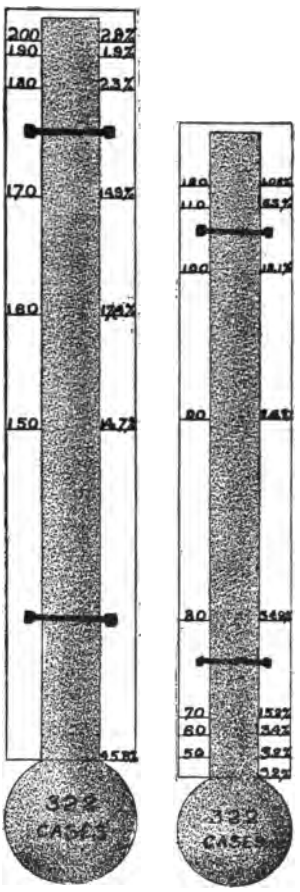

Chart 2.—Graphic representation of blood pressures in 322 men; at left illustrating percentage of height of systolic pressure; at right, diastolic pressures.

by the physical findings of the heart, blood pressure, and kidneys. Men with lung affections were largely refused because of tuberculosis and disease conditions that manifestly were sorely in need of treatment. For

high blood pressures men were not disqualified unless the systolic pressure was over 180 mm. Many between 150 mm. and 180 mm. were advised to take treatment and return later, their condition being explained to them.

Chart 4 is the part of the work in which we are particularly interested. It shows, now numbering 525, the men that we have kept at work and are observing at least once a month. This is the class of case that

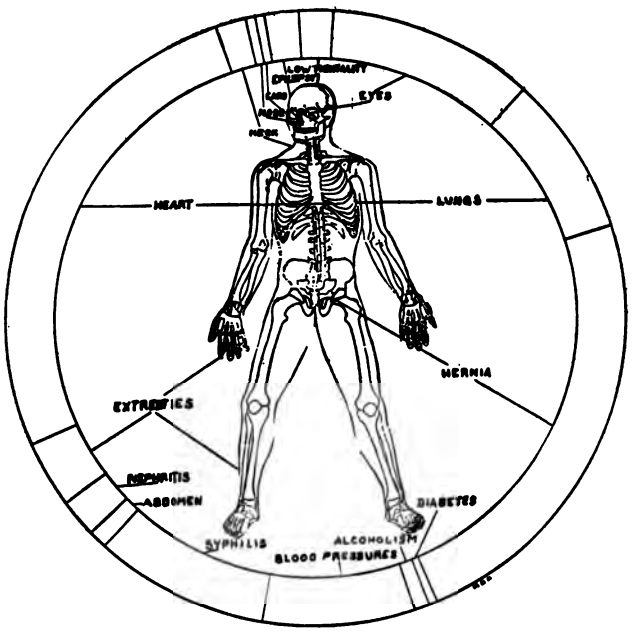

Chart 3.—Anatomic distribution of defects that disqualify.

we are trying to regenerate physically and make into useful and efficient citizens. Let us take the eyes first.

During the latter part of 1913 it was noticed that there was a large number of trachoma cases in our mills and vicinity. After some delay the U. S. Government was petitioned to make a survey of the village of East Youngstown to see to what extent tra-

choma existed and to find its cause and remedy. The Public Health Service sent to our aid Major J. W. Schereschewsky, who after an examination of 5,962 of our employees found seventy-six cases of positive trachoma; a percentage of 1.3. He also examined 652 schoolchildren, mostly sons and daughters of the same men, and found that there were ten cases positive; a percentage of 1.53.

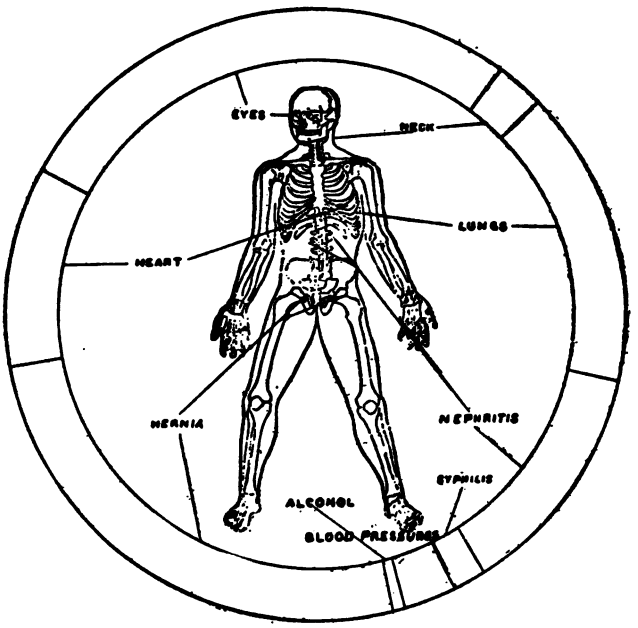

Chart 4.—Anatomic distribution of defects of men under observation.

The company immediately opened a hospital for the quarantine and treatment of these cases. Drs. Hartzell, Biercamp and Goldcamp, eye specialists, were employed to administer the treatment and nurses were hired to assist. A sleeping room, loafing room, dining room and kitchen were installed, and a sufficient amount of help to care for them, including a patrolman to enforce quarantine. Many were operated in the general hospital at the expense of the company.

After being improved and removed from the infective class, these men were returned to work and kept under observation. During the last year only five cases have recurred and the patients have been obliged to receive further treatment.

Acting on the further suggestion of Dr. Schereschewsky the company employed two full time surgeons, Dr. R. B. Dobbins and myself, who from April, 1914, to April, 1915, examined the eyes of 5,248 applicants for employment and have found twenty-eight positive cases, five recurrent cases, ten cases in persons who had lived in our vicinity less than five days, giving a percentage of 5 against Dr. Schereschewsky's 1.3 per cent. of the year before.

The patients that we found were treated partly at the expense of the company and partly at the expense of the township trustees. One point I wish to bring out is that the positive cases in persons who had lived with us less than five days were probably the foci of the twenty-eight cases, and illustrates that trachoma is not limited to East Youngstown, but is in your own city if you look for it. A further fact must be noted, and that is that no city or industry can stamp out trachoma without the assistance of all cities and all industries. Nevertheless, I am sure that I have positive evidence that some industries engaged in the physical examination of their working men fail to make any effort to discover this disorder.

Another class of eye cases under constant supervision are those men with one eye who for their own protection are required to wear goggles while at work. This is accomplished by daily inspection made by the safety inspectors.

Hernias ran 2.6 per cent. in our examinations, and all examined by us either wear a truss or have been operated on. We have ninety-six trusses on men with hernias, and in order to know whether they are wearing these trusses or not, at frequent intervals and with-

out previous warning they are inspected. During the last year we have operated on those who desired an operation and now have done twenty-two herniotomies free of charge. These hernia patients were in the hospital on an average of eighteen days and returned to their usual occupation at the end of six weeks. So far there have been no infections or recurrences. Heart and high blood-pressure cases are changed if necessary to work suitable to their condition, treatment given sometimes by us, more often by family physicians, but they are always kept under supervision. Lung cases under observation are mainly in those men who show indefinite symptoms of tuberculosis and in whom we are not positive as to diagnosis.

Those having tuberculosis are placed in sanatoriums. For the nephritics we insist on treatment and make frequent urinary examinations to determine their condition.

Our practice of examining men who return to work following an illness, and who are leaving work because of sickness, is an absolute necessity. Recently we had its usefulness forcibly demonstrated to us. It was our fortune to find early in the day two cases of smallpox. These men were immediately sent home and all in their departments were vaccinated. In three days and a half without increasing the medical force, Dr. Dobbins and myself vaccinated 2,204 men. Of this number there were 1,183 fair or good vaccinations, in spite of the fact that many had been previously vaccinated, and to date there have been no infections. The result was that smallpox was eliminated from our mills.

The Ford Company and others have demonstrated that supervision of sickness in a factory diminishes absenteeism from that cause to a very large extent, and markedly decreases the time lost from work.

To properly understand his duty in this work one must have a fairly clear vision of its relation to the

individual, the industry and to society. An industrial medical expert is engaged not only in the work of preventive medicine, but also in the science of preventive surgery. It is just as important to the individual that we do not overload him and cause a hernia as it is to prevent him from acquiring tuberculosis or lead poisoning. It is as necessary that we learn the safety limits of fatigue, with its consequences, as to prevent smallpox or other contagious disease. We must learn what the human body can safely do, and then ask it to do it. The increased efficiency of the laborer betters his condition in ratio to his production, and his production depends on his physical condition. Certainly a working man has the right to be protected from syphilis, tuberculosis and other infectious and contagious diseases.

Surely it is not right to ask a man with heart disease to compete for his living with one with a sound heart. It is proper and fair that we, as agents of society, until that day comes when society shall employ some other method to do this work, should endeavor to find these defects and remedy them. It has been our desire to relieve all those unfit when we can.

In this regenerative work we have tried to eliminate all appearances of paternalism, and a possible result, pauperism. We have felt it much better for the afflicted to pay a part or all of the bill required to make him a useful unit of society. Many men were required to pay the cost of medical care though the money was loaned them by the company. Men in sanatoriums were cared for under this plan, and the cost in general hospitals was paid by the individual. Some patients found unable to pay were placed by our medical force, through the various charitable agencies, in the institutions that were suited to their case. The net result to the working force is that they are protected from disease while at work, and that if ill, someone is interested in arranging that they may have a chance to become well.

Any industry is but an agent of society and has no more right to be extravagant and countenance preventable wastes than has that agent of society which we all recognize, our national government. Preventable loss from work due to sickness and accident is a bill that we all contribute to in the daily cost of living. Grieves estimates that it costs on the average $35 a man in the steel industry to hire and bring him to efficiency. If an industry can keep a constant force by eliminating sickness and accident as far as possible, it may make a greater profit; also the individual does not lose his wage, which he sorely needs, and society does not have to dispense with production which it must have if it is to compete with the progress of the world. Society must profit if there is a decrease in the loss of productivity due to sickness and it must gain if there is a daily increase of productivity due to increased efficiency of healthy workmen. No less valuable is the instruction given those who in the past have been the hardest to reach. In this movement we practically have a compulsory education of adults in the value of preventive medicine, and ultimately all must learn that a healthy body is the greatest asset toward a prosperous life.

A further question is asked, "What is to become of the rejected and unfit?" Economically, the problem is better for society if it can see the cost of the burden of the unfit than if the debt is concealed as we now have it. If any industry pays an employee two dollars and his producing capacity is in reality worth but fifty cents daily, then that industry appears to be giving in charity one dollar and fifty cents. Industries in the last analysis do not pay the loss at all, but somewhere it is charged into the cost of production, and you and I, members of society, pay the loss in our daily cost of living. Without a doubt those reparable should be compelled to improve their physical condition, if possible at their own expense. Those unable

to bear the financial burden must be provided for by society, which must expand its facilities for medical work. The bill to the community should be borne by all. I see no better way than state insurance, which makes a man, while well, contribute toward the cost of care for society's infirm. If it is fair for a state to insure us against incapacity due to accidents, it is right that the state or nation should insure us against sickness and incapacity due to old age.

Finally, the solution of this great problem rests in the knowledge that medical men possess, and their opportunity to use that knowledge. Industry is beginning to ask for us and the response, I am sorry to say, is not just what it should be. No medical man can expect to solve these problems if he devotes but a part of his time to this work, and yet that is the sentiment from many in the field. This work is fast becoming a new specialty in medicine, and if one desires to render a big and lasting service to humanity, this branch of preventive medicine offers an opportunity which is not exceeded by any other.

OCCUPATIONS AND THE VENEREAL DISEASES

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Venereal diseases are, of course, not directly related to occupations, and are therefore in no sense to be considered as occupational diseases. There is ample evidence, however, to prove that the character of certain occupations and the environment of industries are important predisposing factors in their spread. Industrial health hazards have been defined as working conditions which, while they may not impair the more resistant worker until after a prolonged period, produce morbid conditions in the average worker, and tend ultimately to create preventable and degenerative diseases in all persons so subjected. These hazards readily fall into several recognized groups — the dusts and chemical irritants, the trade poisons, the microorganisms, such as anthrax, which are directly disseminated through industry. Then there are certain diseases, of which tuberculosis is an example, wherein the occupation itself is not so important as the conditions under which it is conducted. Dampness, darkness, devitalized air, physical inactivity and fatigue are illustrations of such conditions. There are still other groups of hazards which owe their origin to prevailing beliefs among those engaged in various industries, and to the mental depression brought about by the conditions of labor. For example, the common belief that the use of alcohol will counteract the effects of the dusts and poison hazards leads to a supplementary hazard known as industrial stimulation. Similarly unwholesome, insanitary, depressing surroundings

combined with lack of ample water supplies encourage excessive use of other stimulants of like character or even of serious habit-forming drugs.

There is increasing evidence in support of recognizing social and moral hazards of industry as well as health hazards. Venereal infections illustrate a group of diseases not directly related to industrial health hazards, but closely related to moral and social hazards of occupation.

Certain industries are so conducted that young men and women are required to associate under conditions calculated to deaden ambition and self-respect, to arouse sex impulses, break down moral protection, preclude marriage, and eliminate home influences, thereby placing a premium on promiscuous sex relations and the contraction of venereal infections. In such ways industry plays a large part in the problem of venereal disease dissemination.

During the past year in the Boston Dispensary 369 new patients coming to the evening pay clinic were classified as follows:

Single under 21 years of age.....	23.5	per cent.
Single over 21 years of age.....	65	per cent.
Total single.....	88.5	per cent.
Married under 30 years of age....	6	per cent.
Married over 30 years of age.....	5.5	per cent.
Total married.....	11.5	per cent.

These patients gave their incomes as:

$10 or less per week.....	41 +	per cent.
From $10 to $15 per week.....	48 +	per cent.
From $15 to $20 per week.....	9 +	per cent.
Over $20 per week.....	0.9	per cent.

Other facts in the social histories of these men indicated that the majority of them were living in lodgings. It is not necessary to picture the environmental and social conditions under which these men live, nor to do more than mention what these conditions mean when combined with a prevailing belief in the so-called sex

necessity for men. In a sense there is involved here a moral hazard which is comparable to the health hazard described as industrial stimulantism.

Other industrial hazards of this character are well summed up in the following cases and the comments of Mrs. Raymond Robins.

In one of the unorganized factories in a city on the Atlantic coast where hats were made a young Russian girl was insulted by the foreman. She stood her ground and told him in plain language what she thought of him. She was discharged for insubordination. The girl wrote a letter to her employer, sending this letter by registered mail. Probably the employer never saw the letter; at any rate, the girl never received an answer, and for two weeks, coming steadily to the end of her earnings, she was looking for a job. That she finally found work was due to the accidental meeting with a friend from another city. Here too a foreman insulted a young foreign girl; here too the girl stood her ground and told the foreman what she thought of him in plain language; here too she was discharged for insubordination; and then, the story changes. She told the foreman in her broken English that he had to show "just cause" for her dismissal and when at that moment the union organizer, a young American girl, came into the factory to look after some other matters of business, the young immigrant girl told her the story of the insult. An apology was asked of the foreman. This he refused to give. Thereupon a shop meeting was called and two hundred-odd girl workers laid down their tools and voted to go out on strike unless the foreman made his apology. Again the foreman refused to apologize. The strike was called and then it was manifest that the foreman did not run the factory. He had to report the strike to his employer. When the employer heard the story and when he found that the facts of the case as reported were true he not only insisted on the apology being made by the foreman in the presence of all the workers but he dismissed the man at once.

But if the low wage shows the darkness of tragedy, there is also the light of heroism. It is essential that it be definitely understood that there are girls by the tens of thousands who have maintained the integrity of their womanhood in the face of great personal suffering and self-sacrifice, as well as in the face of grave temptation. I know girls who have lived twelve in a room, on twelve mattresses, because their earnings did not permit them better sleeping accommodations, and who have lived for three years at a stretch on rye bread and olive oil, unless invited out for a meal. I know girls who have simply paid for the space of half a bed during the night; and

that same bed was not only shared by them during the night with another girl but had been used by two girls during the day time, these other girls being night workers. I know girls who take it as an every-day matter-of-fact experience of working girl life that they should daily go without their luncheons. I know girls who have entered a saloon because they could there get a bowl of soup as well as a glass of beer for 5 cents, receiving in that bowl of soup better nourishment than any other expenditure of 5 cents could bring them. I know other girls who, with equal matter-of-factness never think of spending money for car fare or lunches or laundry or outings, and never dream of earning enough to make life even half-way decent and comfortable, or are given a chance for any realization of aspiration or ideals or education—or sweetness of fresh air in the mountains or by the sea—and yet these girls by the tens of thousands, in the face of such constant denial of all that makes life worth while, have held their womanhood intact and protected its integrity.

To the courage, the grit, the fineness of character all can testify who know intimately the daily life of the working girls. But well may we question the civilization, the democracy, the Christianity of a community tolerating such conditions. We are demanding in the every-day life of our working girls the stuff out of which heroes and martyrs are made.

The question of the wage is not whether a girl can or cannot hold her own in the face of suffering and poverty and temptation; but whether any able-bodied intelligent young woman is to put all the years of her girlhood and womanhood, all the possibilities of the joy of her motherhood, in jeopardy because she is giving her all in service without receiving sufficient remuneration to make possible decent nutrition, decent clothing, decent living conditions for herself—conditions making for the education and development of all the fine powers hidden and held within her.

Venereal diseases are peculiarly a group which do not lend themselves to statistical or etiologic analysis beyond the purely scientific facts of their origin and methods of transmission. It will be profitable to summarize here these scientific facts. Venereal diseases are communicable parasitic infections due to identified organisms; their methods of transmission are known, and a practical laboratory and clinical technic has been worked out for diagnosing each of them; they are widely prevalent throughout the world and are not limited to any races, sex, age or condition of people;

they find their chief opportunity for dissemination in the sex relations of infected individuals with other individuals who are susceptible; they are not exclusively transmitted through the promiscuous sex relations condemned by society as harmful alike to the health, the morals and the social progress of a people; recent methods of treatment make practicable the shortening of the period of infectivity for others and improve the chances of ultimate recovery for the individual; once contracted they may run their course to recovery with or without medical assistance, but an unknown and very large percentage of those infected never regain their health or never cease to be carriers of one or both syphilis and gonorrhea and therefore a continuous menace to society. Various efficiency tests of syphilis and venereal clinics have shown averages of 11 or 12 per cent. of only the cases discharged as cured, and high percentages of cases unimproved leaving after one or several visits. What this means to the public can perhaps be paralleled by the spectacular outbreak of smallpox which occurred in Montreal in 1887, when the panic stricken inmates of a hospital after exposure to an unrecognized case were permitted to scatter through the city.

With these general facts before us, the medical lines of attack are clear: 1. We must seek by cooperation with or control of the infected individual to prevent his infecting others. 2. We must endeavor by education and administrative measures to enable the uninfected members of society to protect themselves against infection. Early diagnosis and ample treatment facilities are essential, and ultimately we may expect to see adequate plans developed for personal prophylaxis, chief among which must stand continence. Meanwhile, much may be done with the environment, and this brings us back to occupations.

In the conditions I have cited we have a series of hazards, whatever their particular designation may be, which need to be eliminated by society.

Alcohol is one of the hazards which is a connecting link between occupation and venereal diseases through the agency of prostitution.

The records of a venereal clinic in New York examined by Mr. Platt during the past year shows the street prostitute to have been the source of infection in 36.6+ per cent., house prostitutes 18.9 per cent., domestics 10 per cent., friends 10 per cent., working women 7.7 per cent., wives 1.5 per cent., and unknown, 14.7 per cent. of the cases.

When we set down all our facts concerning venereal diseases and attempt to lay out a plan of campaign for their reduction, we find four important points of attack: (1) the medical — prevention of spread from known infected persons to others; (2) the educational — instruction of the public in methods of avoiding infection; (3) the environmental — repression of prostitution and safeguarding of industries and recreation from predisposing factors; (4) the moral — training the individual in habits of control of sex impulses, and inculcating ideals of marriage and parenthood.

In all of this the physicians and the industrial leaders, among both employers and employees, have a part to play. Every system of physical examination and treatment of industrial workers has developed facts showing the great importance of syphilis and gonococcus infections in lowering the efficiency of workmen and increasing the public and private expenses due to ill health, moral ills and death.

Surgeon Banks of the United States Public Health Service has estimated on the most careful statistics we have in the country that there are at least 2,500,000 cases requiring medical treatment each year in the United States. Who are treating these cases? How far are industries responsible for the recruiting of this group?

The purpose of this paper is to direct attention to the importance of considering venereal diseases in relation to industries. Many experiments are now on

record of industrial corporations starting educational activities in this direction. Social hygiene societies and public departments of administration are doing work along new and practical lines. The medical profession is awaking to its social responsibility in this field. Industrial employers and employees may be confidently counted on to cooperate in practical plans which the medical profession proposes.

105 West Fortieth Street.

SICKNESS INSURANCE

A PREVENTIVE OF CHARITY PRACTICE

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Industrial hygiene and the health of the people whose daily wage depends so largely on their physical efficiency, have come to constitute one of our most serious industrial problems.

Progressive leaders of labor have found that industrial hygiene is common ground on which they can meet capital, and affords excellent opportunity for bettering working conditions.

Wise business men are coming to realize this and are giving very serious consideration to the physical fitness of their employees.

Health authorities are finding that the total environment of the workers is a more important factor in causing disease than the germs of the infectious diseases, which have heretofore occupied so much of their time.

The magnitude of the problem can hardly be comprehended. There are approximately 30,000,000 wage earners in the United States. Each one of these loses an average of about nine days per year on account of sickness. This estimate is based on an investigation made for the U. S. Commission on Industrial Relations of about 1,000,000 industrial workers in the United States, and nearly coincides with the German and English figures for over 26,000,000 insured wage earners, which show an average of eight to nine days of sickness per year. Estimating the daily wage at $2 and the cost of medical services at $1 per day, the annual loss would amount to over $800,000,000.

This leaves out of consideration the human suffering and losses due to death and decrease in efficiency which follows illness. It also leaves out of consideration the effect on the family when the breadwinner is disabled.

When the losses due to sickness come to the families living just above the poverty level, this circumstance causes them to fall below that level. These are the conditions which have compelled the partnership between poverty and disease. There is no need to tell physicians that sickness increases as the income decreases; that the mortality rate in the poorest sections of a city is often double that of the best sections; that the infant mortality in the families in which the father earns less than $10 per week is three times that in the families in which the father earns $1,200 or more per year,[1] and that the tuberculosis rate is roughly in inverse ratio to the income.

There is no question in the mind of the experienced physician that at times poverty is caused by disease, and at times disease is caused by poverty, and that this vicious circle must be broken before disease prevention can make much headway among this group of people. Of what use is it for us to tell the tuberculous workingman to stop worrying, get plenty of fresh air, eat fresh eggs and drink milk with plenty of cream, and sleep in a separate room, when the week's wages are already barely sufficient to meet the actual needs of the family. The low paid workers are forced to live in unhealthy environment and on a poor diet, which lessen resistance to disease and cause sickness, which in turn results in unemployment, decreased income, demoralization, and dependency.

CONDITIONS UNDERLYING THE PROBLEM OF THE WAGE-EARNER'S HEALTH

The causes of sickness are many and ill defined. There are causes in the workshop for which the industry is clearly responsible. There are home environ-

1. Duke, Emma: Infant Mortality, U. S. Children's Bureau, p. 45.

ments for which the workers are responsible. There are community conditions for which the public through governmental agencies is responsible. But, there are many conditions for which there is a joint responsibility and an overlapping of the fields in which each must share in the other's work for betterment.

1. *Conditions for Which the Employer and the Industry are Responsible.*—There are so many diseases for which modern industry is beyond all question responsible that space will not be given even to enumerate them here. It is only necessary to point out that, outside of the purely occupational diseases like phosphorous, lead, mercury and arsenic poisoning, and those diseases due to working in compressed air and the like, there are many ills which are caused or aggravated "by hours of labor which cause excessive fatigue; by machinery and methods of work and payment which cause nervous strain, and by general sanitary conditions in places of work."

It is therefore obvious that industrial diseases are "morbid results of occupational activity traceable to specific causes and labor conditions, and followed by more or less extended incapacity for work." [2]

The occupational hazard is often obscure, but is clearly developed when careful records are kept of all disease among a large number of workmen in many occupations, as was done by "The Local Sick Benefit Society of Leipzig and Vicinity" for the period 1887-1904. These records showed that the number of days lost per year on account of sickness varied according to occupation from four days for clerks and salesmen to 12.15 for polishers and metal grinders, 12.56 days for iron and steel workers and 14.43 days for refiners in sugar factories.

2. *Conditions for Which the Public is Responsible.*—The conditions for which the public is primarily responsible are community conditions. In times now

2. American Labor Legislation Review, 1910, i, No. 1, p. 125.

passed health authorities confined themselves to operating quarantines and the abatement of nuisances, but now under the broadening influence of a clearer knowledge of the causes of disease, they are extending their activities beyond what was originally considered the province of the government. At first they went beyond the streets and public places and fixed regulations for proper housing, pure water, pure food, sanitary workshops. As working and living conditions have become more complex, the duties of the public have developed until now its regulatory power is extending into the home and shop, and the highest courts of the land are upholding this power, as is seen in decisions affirming the right of the state to limit hours of work and to compel the payment of wages to women which will be sufficient to maintain an adequate and healthful standard of living.

3. *Conditions for Which the Employees are Responsible.*—With all the conditions for which the public and employers are responsible eliminated, there still remains a large residue for which the employees are responsible. In spite of the realization of employers of a larger degree of responsibility for the health of the workers, and in spite of the ever-broadening sphere of public activities to protect the health of all citizens, there remains the individual responsibility for the home environment. It must be stated, however, that the responsibility for their environment does not rest altogether on the workers. No one is able to choose every part of one's environment, and this is especially true of many workers who have little or no choice, but must accept what is offered in the way of employment, and must also accept the home environment for which they can pay with the wages earned. This will continue to be true, especially in the unskilled group, so long as the supply of laborers is greater than the demand and the competition for employment makes it possible for the employer to fix the terms of employment.

The great burden of maintaining proper hygienic standards in the home, after all, rests on the wage earners, who are least able to bear it and who are so often ignorant of their importance. Physicians know, from experience, of the inability of individual wage earners to meet this responsibility, but they are apt to conclude that volunteer welfare workers, relief societies, and charity organizations are providing for the cases which come to their knowledge.

It is necessary, therefore, to point out that recent investigations show that about one-half of the native-born families and two-thirds of the foreign-born families in the United States had incomes of less than $750 a year. Seventeen per cent. of all native-born and one-third of all foreign-born families had incomes of less than $500 a year.[3] These investigations included incomes from all sources and included earnings of wives and children and payments from boarders and lodgers. The inadequacy of these incomes may be measured when it is stated that the consensus of conclusions taken from a number of careful studies of expenditures of workingmen's families show that an average family cannot live for less than $800 to $900 per annum. (The average family is defined as composed of man, wife, and three children under 14 years.) In small cities and towns where rents are lower, the amount required is smaller. But even in these towns a minimum of $700 to $800 may be fixed with the assurance that the amount required is more rather than less.

The adequacy of this standard may be judged by the manner of expenditure, as shown by budgets studied in families living in New England and other Eastern cities, whose incomes averaged about $750 a year, the family being of the average size.

With an income of $750 a year and an expenditure of $650 a year for the bare necessities of living, the narrow margin is all too apparent. When the numer-

3. Reports of the U. S. Immigration Commission, 1911, xix, 125.

ous necessary sundry expenses are deducted from the margin of $100, there is little left to provide a surplus to meet the expenses of an emergency. No reasonable thrift can save from this small margin a sum sufficient to pay for a death, an additional birth, or unusual sickness.

The question may well be raised as to whether an income of $750 is sufficient for the average family. As to more than half of all the workingmen's families in the United States whose income is less than $750 a year there can be no doubt as to their inability to maintain healthful conditions in the home.

The conclusion is apparent, therefore, that the largest share of the responsibility for the wage-earner's health rests on the workers who cannot carry

TABLE SHOWING DISTRIBUTION OF FAMILY BUDGET

	Per Cent. of Income	Amount
Food	47	$360
Rent	17	126
Clothing	16	123
Fuel and light	5	41
Health	2	17
Sundries	13	98
Total	100	$765

the load. Society expects these to carry the greatest part of the burden of sickness, when under the best conditions they can barely meet expenses and furthermore they have the lease experience in disease prevention. This is expected of them after they are handicapped by an environment which our social organization has for centuries decreed for those who are unskilled or untrained for some trade.

TREND TOWARD COLLECTIVE ACTION AND INSURANCE METHODS

With the responsibility for the wage-earners' health so definitely fixed on the employer, the employee and the public, and with this responsibility so intimately related that the duties often overlap, cooperative action is apparently the best remedy. Collective action is the only method which will enable each group imme-

diately to meet the problem of relief of sickness without greatly increasing the amount now expended for this purpose. If this collective action is further extended into the field of disease prevention, the present cost can be greatly reduced. This is, in fact, the essential principle of sickness insurance.

Insurance is a method by which a group of persons, each in danger of some loss, the incidence of which cannot be foreseen, can distribute the cost of such loss, where it occurs to any of them, over the whole group and lighten the burden of its most serious economic effects. The results are the strongest incentive to lessen the cost by diminishing the frequency of losses. In sickness insurance the employer, the employee and the public pay the premiums for insurance against the loss to which each group is liable in case of sickness of employees. In this way the loss is distributed and a strong incentive created in each group to reduce the cost by preventing sickness. This division of the cost would greatly reduce the amount now spent by employees for sickness, and distributes the payment over such a long period of time that the poorest paid wage earner can meet the expense without materially lowering his present standard of living. Furthermore, it would meet this expense in a business-like way and leaves no "taint of charity."

While relief of sickness must be the primary object of sickness insurance, prevention of sickness will be the greatest result. There can be little doubt as to this when the results of insurance in other fields are studied. It is only necessary to mention fire insurance and the great effort to prevent fires by building regulations, fire inspections and the like; marine insurance and efforts to prevent losses at sea; and accident insurance and the "Safety First" movement.

The experience with sickness insurance in foreign countries has been such that practically every European country has some form of sickness insurance law, and in those countries with comprehensive laws, the results

in stimulating efforts to prevent sickness have been very encouraging. It is also a significant fact that no country which has enacted laws on this subject has repealed them; on the contrary, many have extended and strengthened them.

In the United States no state has enacted a law on the subject, but there are several million persons insured against sickness in labor unions, establishment funds, fraternal orders, or commercial companies. It is therefore no novelty in this country, but a method which is growing popular, as is shown by the increasing demand.

A PRACTICAL PLAN FOR SICKNESS INSURANCE

To meet the requirements for the relief and prevention of sickness in the United States, a sickness insurance law could be enacted by Congress to apply to all industries in all the states, or by the state legislature to apply within the state.

An examination of the most successful European governmental systems of sickness insurance and of the principles and methods practiced by mutual benefit societies, trade unions, and industrial establishments in this country suggests that a sickness insurance system, whether state or local, should include the following provisions:

1. *Insured Persons.*—All persons engaged in gainful occupations and earning a specified annual income ($1,000 or less) should be entitled to the benefits provided under the law.

All persons earning more than the specified annual income should be allowed to qualify for the same benefits or greater benefits according to annual income.

2. *Funds.*—A tentative ratio of contributions has been suggested as follows:

Employees	50 per cent.
Employers	40 per cent.
Government	10 per cent.

Provision should be made for persons earning more than the specified income whereby they could pay a larger proportion of the contributions and receive larger benefits.

3. Benefits.—The following benefits should be provided:

Cash Benefits: Weekly cash payments to begin after the first week of disability due to sickness, nonindustrial, accident, or to child bearing by the beneficiary, for a period not to exceed twenty-six weeks in one fiscal year.

Death Benefits: Cash payment to legal heirs for death due to sickness or nonindustrial accident.

Medical Benefits: To include adequate medical and surgical care, beginning with the first day of disability, whether due to sickness, nonindustrial accident, or to child bearing by the beneficiary or the wife of the beneficiary, and limited to a period of twenty-six weeks in one fiscal year unless the time is extended by the commission.

4. Cost.—Preliminary estimates indicate that the total contributions would not need to exceed 50 cents per week per insured person, that is, employee 25 cents, employer 20 cents and government 5 cents, for a minimum of benefits of $7 per week for disability beginning after the first week, $200 for death, and adequate medical and surgical care.

5. Administration.—All matters of promulgation of rules and regulations and appeals should be vested in a commission created for this purpose.

Subject to appeal to the commission, all executive authority should be vested in a director appointed for this purpose.

Subject to appeal to the director all medical benefits should be under the supervision of the medical director who should be closely related to the health department.

All matters of local administration should be vested in local boards of directors which should be federated according to districts, in order to lower the costs and increase the efficiency of local administration. All local and federated bodies should be subject to supervision by the central authorities, and also subject to the rules and regulations promulgated by the commission.

The commission and all local and federated boards should be composed of persons representing the contributors to the funds. The number representing employees and employers should be in the same ratio as their respective contributions.

Provision should be made for free choice of any physician registered on the local panel, and all persons licensed under the laws to practice medicine should be allowed to register on the panels. But the number selecting any one physician should be limited.

Relation to the Medical Profession.—Without adequate medical benefits, both clinical and preventive, the whole plan will prove a failure.

These benefits should provide adequate medical and surgical relief, including specialist and dental services, medicines

and appliances in home, hospital, or office, as the case may require, for all disability as provided under the law or regulation.

To provide these benefits there should be a corps of all-time medical officers and nurses, and local panels of physicians, specialists, dentists and druggists to provide such relief as may be authorized by the annual contract.

Corps of All-Time Medical and Health Officers.—The officers of the medical corps should be carefully selected, and after a probationary period of satisfactory service, given a life appointment subject to dismissal for inefficiency or immoral conduct.

In the federal plan the medical officers should be detailed from the present United States Public Health Service.

In the state plan a medical corps should be created along the same plans as the present commissioned corps of the Public Health Service and the state health department reorganized on such plans as would provide an efficient supervision of the medical benefits.

The duties of the medical corps under federal or state plan should be to have charge of all hospital and dispensary relief; to examine all insured persons claiming to be disabled, and issue certificates in accordance with the regulations promulgated by the commission; to advise the administrative authorities and all contributors to the funds as to the best measures for the relief and prevention of sickness; to advise with the physicians attending sick members as to measures which will shorten the periods of disability; and to perform such other duties as may be fixed by regulations. The corps of nurses should be selected and appointed in the same manner as the medical corps, and should aid the medical corps in all of the duties required of it.

The further duty of visiting and nursing disabled members in their homes should be imposed on the nurse corps under the direction of the attending physician or visiting board of the funds, as the case may be, but always under the supervision and approval of the medical corps.

Panels of Physicians, Specialists, Dentists and Druggists.—In every local or federated jurisdiction, panels of physicians, specialists, dentists, and druggists should be contracted with to furnish adequate services to all insured persons who prefer to be treated in their home or in private office.

These contracts should, by preference, be made through the medical societies and all the administrative details left to the societies, but strict provision should be made that any person, licensed under the state laws as competent to perform the services specified, must be allowed to register on the specified panels without regard to the particular school said person may have graduated from.

Each insured person should have the privilege of making his own choice of physician from among those registered on the panel for his district. This choice should be allowed once each year, or oftener if some good reason is furnished. The number choosing the same physician should be limited to such extent as will insure adequate service on the part of the physician.

Payment for services should be made on a per capita basis and each physician should receive the same annual amount per patient whether the patient is sick or well. At the end of each month or quarter the physician should receive pay in accordance with the number of insured who had selected him.

The same methods of capitation payment and selection should be provided for dentists and druggists.

This method of payment and selection should prove to be for the best interests of all concerned. Those rendering services or selling medicines and appliances should receive the same capitation fee and there would be no incentive to render excessive services or furnish excessive supplies of medicines or appliances in order to increase their income. On the other hand, the fact that the patient has the right to change his choice would be incentive sufficient to make those chosen do their best to please.

There will be a further inducement to render efficient service to all patients in the fact that an officer of the medical corps will have to see every disabled member as often as may be necessary to keep informed as to his disability, in order to issue the certificate required. This double medical examination would not only increase the efficiency of the treatment, but would prevent malingering, as it is not apt to be successful under the double examination and observation.

Hospitals and Dispensaries.—As rapidly as possible local boards of directors should be federated according to the most favorable districts so as to build, buy, or contract with, hospitals and dispensaries for the care of its disabled members. These should be placed in charge of the medical corps and contracts be made for such special services as may be required. Any patient should be admitted to hospital or dispensary treatment on the approval of a regular medical officer, but the amount of the capitation paid to any doctor or druggist for any person so admitted should not be reduced because of such admission.

Visiting Boards.—To further insure that every beneficiary received just treatment and none be allowed benefits to which he is not entitled, provision should be made for the organization of visiting boards composed of insured persons whose duty should be to keep in touch with each disabled member until he has recovered. These visiting boards should also keep in touch with the medical officers and visiting nurses on duty in their district.

THE POSSIBILITIES OF SUCH A SYSTEM

Of course, it is borne in mind that a system of sickness insurance such as has been outlined should be evolved through federal or state legislation, or both, and that starting in a limited field it could be gradually extended and perfected. But the beginnings of a cooperative governmental system should be made as soon as possible with the object in view that each one of the 30,000,000 workers in the United States should eventually receive adequate medical and surgical care.

With adequate financial relief when unemployed on account of sickness, he would be able to take advantage of the treatment before it was too late.

There would be funds with which to build or buy hospitals in every federated district. These hospitals would be in the reach of all and form part of the benefits to which all would be entitled.

The treatment in the homes would have to be of the best, or the patient would be sent to the hospital. Minor ailments, many of which now go uncared for because of the expense, would receive prompt attention in office or dispensary. Physicians would no doubt institute thorough, periodic examinations of the physical conditions of their clientele, knowing that such examinations would often save their patients from many serious troubles.

Visiting nurses and visiting boards would find in homes many conditions which needed correction to save future trouble. The all-time medical officers would enter the homes of all sick members and with the trained eye of the sanitarian would find many causes of disease which need correction.

Health departments would not have to spend time in lobbying to obtain proper laws and appropriations. Instead, business men, on finding that they were paying for much disease that could be prevented, would see to it that the health authorities were efficient and effective in the work of disease prevention.

PHYSICIANS ARE NOW HANDICAPPED

At present medical practice in the United States is operating on a most uneconomical and unsocial basis. The man on the average income of industrial workers cannot afford to pay the charges for the average sickness expectancy. Among these the physicians are practicing against heavy odds.

A large number of low-paid wage earners and members of their families constitute the "charity practice" of physicians, and many of them are found in the free hospitals and clinics where physicians give their services free; and many more, too proud to ask for charity treatment, either get no treatment at all, treatment too long delayed, or treatment of dubious value from quacks, "patent medicine" men, druggists, and ignorant midwives.

In medical centers large free hospitals are maintained for certain patients called hospital patients, while other patients must go without treatment and many of the hospital patients do not apply for admission because they cannot afford to stop work.

Outside of medical centers there are many large areas which have few or no physicians, because the people are too poor to employ them.

For the most part, throughout the United States hospital accommodations are far from adequate.

The results of this lack of treatment or improper treatment of the poorly paid workers is that many die every year who could be saved, untold numbers become permanently disabled and unable to work, their wives become invalids from no care or improper care during confinement, and thousands of their children die within the first year of life from lack of intelligent care, or become blind, or are otherwise handicapped.

SICKNESS INSURANCE A HEALTH MEASURE

A governmental system of sickness insurance similar to those in successful operation in Europe will enable the physician to receive pay for his practice and hospital work among low-paid wage-earners, and will

allow the patient to receive prompt and proper treatment without forcing him to become a "ward of charity." It will strengthen the economic independence of the worker and at the same time greatly increase and stabilize the income of the physician, as well as enable the medical profession to carry on a more effective preventive work.

The waste from disability and death due to preventable disease is so tremendous that estimates mean nothing to the average mind. The suffering and sorrow due to these causes should be sufficient argument for a sickness insurance law which will place adequate medical relief within the reach of all and provide for preventive measures on a broad and comprehensive plan in which there will be a financial incentive for employers, employees, physicians, and the community to prevent sickness. Such a law would prove to be the greatest public-health measure ever enacted.

DISCUSSION

ON PAPERS OF DRS. MC CURDY, SNOW AND WARREN

Mr. Frederick L. Hoffman, Newark, N. J.: Any plan of national or state sickness insurance is and ever will be primarily a medical question. It matters very little as to how the end is achieved to those who are or will be the beneficiaries of the plan. It matters very little whether it is done by insurance, or whether it is done through the taxing power of the state. I believe that those who are responsible for the English national insurance scheme, if they could have their way and go over the ground again, would not call it an insurance scheme at all, but a national public health service. If we are really sound in our democracy, that the interest of every individual is a matter of government concern, as regards health and longevity, strength and efficiency, then I believe it goes without saying that sooner or later we shall adopt a rational and effective method to carry such an idea as that of Dr. Warren and others into effect. At the present time an enormous amount of ill health exists in the community in that latent, incipient form, when there is the greatest reluctance to seek advice, although there is then the greatest possibility of real prevention and of genuine cure. That reluctance is, of course, due largely, if not entirely, to economic reasons—to the unwillingness or the inability on the part of a large number of wage earners (and with these we are chiefly concerned)

and their dependents, to incur the initial expense. It has been said—and I believe it is true—that the majority of our wage workers have not a single week's wages ahead. Now, if that is true, and if that amounts to $10 or $15, you can see how narrow the margin is between economic dependence and economic independence. If the state, or if insurance companies and societies, can induce the wage earner, however, to set aside a very small portion of his wages, so small that he would not feel it at all, that amount stretched over the course of his life and accumulated at compound interest will, broadly speaking, prove fully sufficient to provide for him and his dependents adequate medical treatment, adequate surgical treatment, adequate medical inspection, and other means for the prevention of illness as well as its cure. Unfortunately, whenever you approach a wage earner with so remote a contingency as sickness (for it is remote, broadly speaking, in the life of the large majority of that proportion of our wage earners who are mostly under 30 years of age), they are, as a rule, unwilling to make that present, though small, pecuniary sacrifice; and in the European countries, at least, compulsion has been the only alternative to a really universal and thoroughly effective system of what we call social insurance, but what really amounts to a system of state medicine. They call it insurance, but nothing is insurance in the true sense that rests on compulsion, on the one hand, and on a state or an employer's contribution, on the other. It is simply a modified form of taxation; and if we are going to have anything of that sort in this country, we must face it from that point of view. I should like to leave that thought with you, for it is of the utmost importance that there should be no confusion of terms.

Dr. George M. Kober, Washington, D. C.: The importance of the subject of industrial sanitation must be apparent when it is remembered that probably more than one third of the population in this country constitute our working classes. Health is the chief asset of the working man, and no greater calamity can befall him than when, by reason of sickness or accident, his earning capacity ceases. It means in many instances the utter financial ruin of the family and is doubtless one of the most potent causes of poverty and distress. An appeal has been made by Dr. McCurdy for an enlightened and humane interest in this important and much neglected subject. There has been need for it ever since the mechanical industries sprang into existence; and it is much to our shame that we have been so tardy to realize the imperative need for active preventive work in connection with industrial diseases and accidents. I certainly hope that the papers that have been presented will make a deep and lasting impression, and enroll into the

ranks of workers in industrial sanitation a large number of able and faithful and intelligent men and women for the prevention of needless suffering and distress. I merely want to point out that of the 143,000 deaths from tuberculosis which were recorded in the census of 1913, probably more than one half belong to the industrial workers; and it has been estimated that fully one half of all these lives could have been saved by the enactment and enforcement of laws for the prevention and removal of dust and fumes, which constitute the foes of industrial life. That is only one of the many instances that can be cited in favor of active preventive measures. Time does not permit me to speak of many other factors connected with this great problem, such as industrial poisons, fatigue from overwork and long hours, the question of temperature and atmospheric conditions. One of the most important conditions is reasonable hours of work. How can we expect men to work day after day and month after month and year after year without wearing themselves out, as long as the hours amount to ten, eleven and twelve as we very frequently find in our steel plants, where they are exposed not only to extreme, hard physical work, but also to excessive heat and other avoidable conditions detrimental to health and life?

Dr. R. W. Corwin, Pueblo, Colo.: Our work must extend further than examination of the man in the mill. His home surroundings should be considered. If possible he should be freed from anxiety, insanitary and unhygienic conditions.

Our attention should be called also to the matter of education. Not only should the employee be instructed, but those above him in authority. The doctor learns new prophylactic facts every day. All others may do the same.

We hear much regarding the use and abuse of tobacco and liquor. No person in authority can ask one under him not to do what he himself indulges in. One cannot expect of his assistants more than he is willing to do himself.

Dr. G. H. Richardson, San Francisco: For the past two or three years, as a member of the Commonwealth Club of this city, I have been studying the various phases of social insurance, and have become very much interested in this subject, particularly as it relates to our profession. I want to bring out one point that was brought to my mind by Dr. McCurdy's paper on the physical examination of employees. I examine for the Civil Service Commission of San Francisco and of course make a large number of rejections, but I have kept no record of these rejections. All over the United States these examinations are being made, and it would be of great service to compile these rejections. The statistics would, I am sure, be of some service to this section. The same thing I know exists in the recruiting depots of the army, the navy and of the marine service. We have no

easy way of knowing the character of the defects giving rise to their rejections, the proportion of men rejected, or most important of all, the ultimate result of these defects on the earning capacity of the individual. It would seem that if they were collected by this section in some proper manner, it would be of value to us in this work. The dark war cloud that now rests over Europe will practically socialize that continent. It is going to make poverty such as the world has never seen, and in consequence the various countries will have to tax themselves, probably by some form of compulsory insurance, to care for their great dependent populations. We must expect that this transition in economic life will affect conditions in the United States; and we as medical men should study and prepare ourselves for the wonderful change it will make on our profession as a means of livelihood and also on our relations to the sick and injured of our community.

Dr. G. H. Taubles, San Francisco: With reference to the paper of Dr. Snow, one of the strong things brought up but not elaborated, was the instance of enormous numbers of girls living under most distressing conditions; and, on the other hand, the statistics of men infected with venereal diseases, most of them unmarried. I think that this is the age of the awakening of the civic conscience, and this condition is one that requires readjustment. The mass of people cannot be deprived of their biologic heritage by the isolation of large numbers under unsuited conditions, causing many of those women to pass through their lives without ever having completed their functions of motherhood, by ruining so many of these men so that they never will have completed their functions of fatherhood. This thing in time must have a serious effect on the entire population. The hopeful thing is that such a section as that of Preventive Medicine has sprung into existence, and it is from the social aspect that preventive medicine will have its strongest effect. That readjustment must take place, and the reestablishment of human beings as biological functioning organisms must take place, and that is social. This is going to be emphasized, particularly at this time, in view of the enormous destruction of life occurring in Europe; and the problem will be presented to us in the United States from the point of view of immigration. We will have many hundreds of thousands of people to take care of directly, and hundreds of thousands to take care of indirectly. The United States has always sent a great portion of its natural products to other continents. This will be more than ever the case in the next decades.

Dr. W. C. Rucker, Washington, D. C.: Dr. McCurdy spoke of the question of overloading the human machine. Years ago the reports of the Marine Hospital Service were filled with references to aneurism among sailors, which was then

very common. Nowadays aneurisms are almost never found among sailors. This is coincident with the substitution of gasoline and steam power on ships in place of man power for the purpose of hoisting sails, moving boats, warping in vessels, and everything of the kind. I believe this has reduced aneurism among sailors, and that what applies to this one craft applies to all others.

With regard to the examination of applicants for positions, on two occasions I have been entrusted with the employment of large numbers of men, and, like everyone who has done this sort of work, I have observed the very close relation between the physical and mental development of men; but there is a type of men physically sound and apparently fairly sound mentally who nevertheless have a mental strabismus. In the employment of men, the exclusion of such applicants is most important. They are invariably trouble makers, a danger to fellow workers and cost a great deal more than they are worth. The simple test of the imagination is one of the best tests for the exclusion of these men, as they invariably have a disordered imagination. If you present to them a sudden emergency requiring the exercise of the imagination you will be surprised at the queer and eccentric answers you will get; and whenever you find men with these queer imaginations it is not wise to employ them. For the common laborer, the man who is supposed to bring a little brain and a great deal of muscle to his job, a blot makes a very good imagination test. Simply take your pen and put some ink on a piece of paper, fold it and unfold it again, and, pointing to the blot, say to the man, "What does it make you think of?" That sounds like an idiotic test, but it is really a sensible test for these men. They will display emotional characteristics under this stimulus to their imagination. Here is a blot that looks to a normal eye like a cloud, and the man is apt to say, "Oh, that looks like a brainstorm. Take it away"—something like that. You will find it a good test.

I have told these things to bring out the importance of the test of the mental condition of workmen, of which nothing was said in the papers. The importance of such a test is illustrated by the case of a man, employed as a boatman running a small gasoline craft, who suddenly began to hit things, bumping into the wharf and injuring his boat. His friends and his employers noticed it, but paid little attention to it. Within a year he had general paresis.

A good many railroad accidents have been due to the fact that the men were in the stages of mental deterioration. I think in our routine physical examination of employees we should pay great attention to their mental condition.

Dr. Leo Munter, San Francisco: The proposition of sickness and accident insurance I believe to be dangerous and bad. The matter of industrial insurance as we have it in

San Francisco has proved to be a bad proposition. At the time when the insurance act first went into effect there were compacts made between physicians of San Francisco and various parts of the state with the insurance companies, whereby the physician was to furnish his services at a minimum fee. The argument was made that industrial insurance was to protect a class of men who were making small wages, who were not earning sufficient to protect themselves in case of accident, and for that reason the medical men were asked to make their fees as low as possible. The argument was also made by the insurance companies and by the industrial accident commission that as we ordinarily charged low fees to these men, we should not charge the insurance companies larger fees for the services rendered. As a result, the association of insurance companies adopted a schedule, which was all the way from 50 to 60 per cent. lower than the regular fees that had been charged for medical services. A great many physicians were requested to sign this schedule and pledge themselves to work for these fees. A great many physicians of San Francisco, to my own personal knowledge, did sign this schedule and agreed to do the work for this minimum fee. At a meeting of the State Medical Society a fee schedule was adopted which was to be ratified by the various county societies, and which was rejected by various county societies. In San Francisco a mass meeting was held which resulted in a protest against binding ourselves to work for low wages. As a result of this protest, the insurance companies have taken it on themselves to dictate who the physician shall be who shall treat the injured employees. They have employed physicians at certain reduced fees, and have made contracts with physicians who would still further reduce their fees by giving a rebate of 25 to 30 per cent. off of the schedule which had already been reduced 50 to 60 per cent.

Dr. Mary Lawson Neff, Phoenix, Ariz.: I have been asked to speak on the psychologic aspect of the question. I examined in Los Angeles a few days ago with Dr. Allen a man, a jitney-bus driver, who had been arrested for charging at full speed into another automobile. He proved to be a paretic, and from time to time in different clinics I have seen many such cases. I believe if we collected them we would find an immense number of industrial accidents due to mental and nervous diseases. I think also the question of mental defect should be given attention. The high-grade mental defective is not recognizable except by a mental examination, and not always then; but a great many mentally defective people find their way into industrial positions that they are quite unfit for. The high-grade defective, for instance, is quite capable of working in a gang under a good foreman, but is incapable of working independently;

and his right placing would depend on the proper psychologic examination, rather than the physical; that is, there are special defects that should be made the subject matter of psychologic work. For instance, a person with a "left hand lag" ought not to attempt to be a stenographer. The person who is "ear-minded" is unsuitable for a telephone operator where a flash light signal is what she has to depend on for her work. So it seems to me that there is a large field for the psychologist—the psychologist with common sense—in this department.

Dr. Otto P. Geier, Cincinnati: I believe that this sort of work if well done in industry is going to stimulate the general practitioner to better work, more accurate diagnosis. I find that we are continually coming across, as Dr. McCurdy does, the mistakes and oversights in diagnosis on the part of the general practitioner; and after a while, when enough of this work has been done, it is going to become a very uncomfortable thing for the general practitioner to remain so slovenly in his diagnosis, and have his families find out from the industrial physician that he does not know his business. It might surprise you to know that there have come before me, with only 1,000 men, three cases of appendicitis within the last six weeks, and two cases of tuberculosis. Those conditions we discover by virtue of the fact that medical inspection is insisted on, and because these men come freely to consult me just as they did their private physicians. That matter then of the jacking up of the family physician, and making the general practitioner do less slovenly diagnostic work, I think, is going to be of some value.

It is also going to help the man who is interested in public health work. If he is interested in a larger budget for the health department, he should be interested in this thing, because if the people seize the idea that it pays to be healthy, they are going to see to it that the public bodies give the public health department more money. In that way it is going to stimulate better health conditions in our cities.

It is a question whether industries should undertake to do surgical work and medical service for its employees such as suggested by Dr. McCurdy, because I think there is a little danger of pauperization; and I think we should steer very clear of this danger. That of course should take care of itself by the inquiry into every man's social condition. If he deserves it, give to him out of your industrial clinic the same service you give in the general public clinic. In order to make this propaganda go with the profession we must steer clear of robbing the physician of his just part of medical and surgical service.

Dr. Sidney M. McCurdy, Youngstown, Ohio: It seems to me that a section on Preventive Medicine has a duty to perform in supporting the physical examination of employees.

The only active opponents that I can discover are the labor unions and they seem to be undergoing a change of sentiment. We should help educate them to the fact that the examination is for honest purposes, and that no one will in the end profit more than the workingman.

The question of psychology and its relation to a working force, I am much pleased to have brought out by Dr. Rucker. Our accident department finds that it can only prevent 35 to 40 per cent. of accidents by mechanical devices, the rest probably belonging to the individual and to his psychologic attitude. I have spent much thought and time in the endeavor to discover an accurate and rapid test for recording the mental condition of applicants for employment. Thus far I have not felt satisfied that any practical tests have been evolved.

Lastly, I wish to thank Dr. Warren for his most able paper on insurance. I do not think that there will be any opposition from the employee when state insurance becomes necessary. We have a relief association, not compulsory, to which 5,600 of our 8,000 men belong. This would seem to indicate that the men appreciate the need of insurance and there is a real desire and necessity for a cheap form of protection. I am a firm believer that while the medical fraternity may suffer a diminution in the size of its fees, for the ultimate good of society, state and national insurance for sickness and old age is the only logical solution of this problem.

Dr. W. F. Snow, New York: The purpose of offering my paper was to bring out, if possible, that there are moral and social hazards in industry as well as health hazards; and that the complicated interlocking of such hazards with those that we technically know as health hazards, makes it possible to attack some diseases in the reduction of their prevalence rather by an attack on these moral and social hazards than directly on the health hazards. Venereal diseases are in this way sufficiently closely related to industry to demand close observation on the part of those working with health hazards in occupations.

Dr. John W. Kerr, Washington, D. C.: Much more might be said on this subject. Its importance to the medical profession has been brought out this morning. I would just like to emphasize its importance in relation to the public health movement; but I feel that health departments should be in closer touch, and that in future plans the work should be placed so far as possible in the hands of health departments. [In order to give practical effect to the resolution already adopted Dr. Kerr moved that a committee be appointed for the further consideration of this subject, to report at the next annual meeting. This motion carried.]

THE NEED OF FULL-TIME HEALTH OFFICERS

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Public health has been demonstrated time and again to be a purchasable commodity. Its value is not generally appreciated, however, and the price is not cheap. Three requirements must be fulfilled before any improvement of sanitary conditions may be guaranteed to a state or a community. These cornerstones on which public health administration rests are:

1. Wise legislation.
2. Adequate appropriations.
3. Efficient health organization.

Behind the three must of course lie public sentiment to cooperate in the enforcement of the measures deemed advisable and make possible their success. In other words, this is the minimum price which any human collectivity, be it nation, state or community, must pay to conquer preventable diseases, and through better health gain increased prosperity.

As a matter of fact, public health organization in the United States has been a plant of slow growth and has been stimulated for the most part by epidemics. The many federal, state and municipal health laws placed on our statute books, having been enacted independently of each other and to meet some emergency of the time, lack uniformity, and not every section has been provided with a local health organization. Moreover, the funds provided to carry on public health work have not been generally sufficient for the purpose. For instance, the total amount appropriated for the work of the State Board of Health of Minnesota in 1915

represented but 0.0034 per cent. of the total revenues of the state based on the figures of 1912, and Minnesota is above the average in support of such work. In at least one state no funds were voted for this purpose.

The conditions in counties and townships all over the land are even worse, practically none of them having full-time health officials. In Kansas, for instance, there were no full-time health officials prior to 1915. The report of the Kansas Commission on Public Health emphasized how unsatisfactory are present conditions from the standpoint of efficiency. The total amount spent for salaries to health officers in the whole state did not reach $42,000, the highest salary paid being in Kansas City, $1,500 per annum, and the average salary being about $310. Naturally, all these officers were also engaged in private practice to gain a livelihood, and many of them held other offices, as coroners and as county or pauper physicians. In many cases it was admitted that politics controlled the appointments, and that it was not unusual to let the lowest bidder have the health office.

In Illinois also, with the exception of Chicago, and of the cities of La Salle, Oglesby, and Peru, which have joined forces, there are, so far as reported, no full-time local health officers. Furthermore, out of 614 cities, towns and villages within that commonwealth, which responded to requests for information, no specific appropriations for health purposes were reported by 425. Of the 189 remaining, 106 had paid health officers, some of whom received as low as $5 per annum.

From the above it is evident that there is opportunity for great improvement, and in my opinion this may best be brought about by the systematic development of local health organization and employment of full-time health officers who are properly equipped to undertake the special duties that should be required of them.

THE IMPORTANCE OF LOCAL HEALTH ORGANIZATION

Of late, special emphasis has been laid on the exercise of larger powers by the federal government in the public health domain. In consequence, the need of strengthening local health administration, especially in rural communities, has been in large measure overlooked, and this subject is only beginning to receive any attention commensurate with its importance.

In other words, while local health administration should be the strongest, in reality it is the weakest link in our chain of national defenses for disease prevention.

It is true that many large cities are well provided, and the reduction in morbidity and mortality rates for the country as a whole in the last twenty-five years is largely attributable to such metropolitan provisions. It must be remembered, however, that 52 per cent. of our total population is rural, that is, live in the country or in towns having less than 2,500 inhabitants. It is for this class that provision should be made.

The federal and state governments cannot be expected to act locally except in great emergencies, it being their function rather to exercise advisory and supervisory powers in respect to local matters. They should encourage the establishment of local health agencies, therefore, and cooperate with them after they are established, to the end that public health work shall be coordinated and conducted in large part automatically in so far as the individual citizen is concerned.

DISSIPATION OF AUTHORITY TENDS TO RETARD DEVELOPMENT OF HEALTH ORGANIZATION

By lack of proper direction in the past, public sentiment has at times given rise to the creation of new and inexperienced bodies, and entrusted them with the performance of health functions independent of already constituted local health organizations. In con-

sequence, there has been dissipation of authority and delay in properly coordinated health development. To take one conspicuous instance, we may cite the laws relating to tuberculosis. They show a tendency to create separate boards and commissions, and even to entrust semiofficial bodies with this distinctly public health problem. In Chicago, for example, "the control of this important communicable disease is not vested in the health department," although there is a close relationship between that department and the municipal tuberculosis board which does exercise this function.

In the interest of economy and efficiency, all purely public health activities of a community at least should devolve on the local health organization, and to scatter them will prevent or delay proper development.

By correlating local public health measures and requiring them to be performed under the direction of a responsible health authority, the community will benefit, and that official will have an abundance of work to keep him busy. If he is not so kept, or if the raising of his salary is a burden, then the size of the jurisdiction over which he has oversight is too small, and it should be enlarged by the joining together of two or more political units.

HEALTH JURISDICTIONS SHOULD BE SUFFICIENTLY LARGE TO SUPPORT FULL-TIME HEALTH OFFICERS

Since it is impracticable for many counties to maintain full-time health officers independent of the municipalities within their borders, it would seem especially advisable for these jurisdictions to pool their interests. What is needed are full-time health officers, and enough citizens should be grouped in each health unit to insure the full services of such a health official. Such services are surely as important to the county and municipality as are those of the sheriff, the recorder or the judge.

By such means will efficient local health administration become possible. Efficient local health organization is undoubtedly the secret of any eminence England and Germany may have had, if they actually had it, over the United States in public health matters.

While in Germany some years ago, I asked one of the highest public health officials what the Imperial Government had done to guard the Empire against the spread of cholera. He informed me that dependence had been placed on the local authorities, and that, while theoretically the Imperial Government had authority to assume control of measures to suppress epidemics, practically the exercise of this authority was unnecessary because of the efficiency of local health administration in that country.

With these precedents in the countries mentioned, and local health organization having been the first to be inaugurated and authorized long before state health organizations came into existence, it is singular that local health administration, especially in the interest of rural communities, has not been farther advanced.

RECENT LEGISLATION OF SOME STATES PROVIDES FOR FULL-TIME HEALTH OFFICERS

In the recent past, however, a notable change has occurred for the better. The employment of full-time health officers has been made by several states the keystone of their sanitary policy. Maryland, Massachusetts, New York, Pennsylvania and Wisconsin, and Porto Rico have incorporated this principle in their laws, the purport of which may be briefly reviewed.

The Maryland law divides the state into ten sanitary districts, each of which is placed in charge of a deputy state health officer. Massachusetts has provided for eight districts in charge of district state health officers; New York for twenty or more sanitary districts in charge of sanitary supervisors; the Pennsylvania law authorizes the state commissioner of

health to apportion the state into ten districts, appointing to each district a health officer and the necessary assistants to supervise and control sanitary affairs, and in accordance with provisions of law, medical inspectors have been appointed for each county in the state by the State Department of Health; while the Wisconsin law provides for the division of the state into five districts, for each of which a deputy state health officer is to be appointed.

In Maryland, Massachusetts, and Wisconsin it is provided that these deputy state health officers must not engage in any other occupation during their term of office, and also that they will be removed from office only for causes affecting their efficiency or good behavior. In regard to their qualifications, the Maryland and Massachusetts laws require that these men must be physicians trained in sanitary science. The salaries specified in the laws vary from $1,200 to $2,500 in Maryland, not more than $3,000 in Wisconsin, and not more than $3,500 in Massachusetts.

We thus find in these laws recognition of the principle on which good health organization is based: employment of officers properly qualified to conduct sanitary work, with sufficient compensation to justify them in giving all their time to public service, and making this their life work.

The above legislation, however, provides only for state health officers, whose duties in respect to local matters are more or less of a supervisory character. As the laws express it, they are to keep informed of the work of local health authorities, and give these authorities such assistance as may be necessary. Their usefulness, therefore, must depend to a large extent on the existence of efficient local health machinery with which they may work. We are as a consequence back where we started, that is, to the need of strengthening purely local health organization if public health work is to progress as it should.

SOME PROGRESS HAS BEEN MADE IN EMPLOYMENT OF FULL-TIME LOCAL HEALTH OFFICERS

The desirability of this program has been admitted, if not given full effect, in some of the legislation enacted by the state mentioned above. The New York law requires that every city, town, or village shall appoint a competent physician to be a local health officer with a four-year term of office, whose compensation in municipalities having populations of 8,000 inhabitants or less shall be not less than 10 cents per capita, and not less than $800 per annum in municipalities having more than 8,000 inhabitants. In certain other states, similar attempts have been made to fix minimum compensations, but these were so small as to preclude the idea of their providing for full-time services.

In North Carolina, however, there are now not less than ten full-time health officers, and their number is increasing. In Massachusetts also, the well-known experiment of several towns combining to secure efficient health service has been successful.

The principle of properly qualified full-time health officers appointed by the local authorities with proper compensation and fixed term of office has also been embodied in legislation recently proposed in a number of states, among which may be mentioned Indiana and Kansas.

The Kansas bill proposed to divide the state into not more than thirty sanitary districts, consisting of one or more counties each. A district board of health was to be created and composed of representatives of the county or counties, and each municipality within their borders. Each board thus formed was to appoint a full-time health officer whose qualifications were to be determined by examination conducted by the chancellor of the State University. These district health officers were to be prohibited from engaging in other business, and, in consequence of the impor-

tance of their duties, were to receive a minimum compensation of $2,000 per annum. The tenure of office was to be dependent on faithful and efficient performance of duties, and the jurisdiction of these health officers was to extend throughout their respective districts unless any incorporated city therein might elect to maintain a full-time city health officer.

By the above means it was expected to establish sufficiently large health duties to insure the full-time employment and retention of efficient public servants. It is legislation having this last mentioned object that should be encouraged.

ABSTRACT OF DISCUSSION

Dr. James Adams Hayne, Columbia, S. C.: We believe in a strong central government in Columbia, the capital, in the management of the public health affairs of the state. Our idea of full-time health officers for a county is that they should be paid by the counties and appointed by and hold office at the pleasure of the State Board of Health. In that way we feel that we remove them from local influences and political entanglements. I am fully in accord with Dr. Kerr. The full-time health officer is most important in public health work. No man can serve two masters. A man doing public health work must at once separate himself from the medical profession, because he at once becomes antagonistic to the profession, that is, the general practitioner. The hardest work that any public health official has to do is to get active cooperation on the part of the general practitioner. The physician is the stumbling block of the public health work. He will not report contagious diseases unless compelled to do so by public opinion. As long as public opinion supports him in concealing his cases of contagious diseases he will continue to conceal them; because he loses his bread and butter if he offends his patients by reporting them to health authorities, subjecting them to the discomfort of having quarantine signs put on their houses, and interfering with their going in and coming out. The public is being educated and soon the doctor who does not report will lose his practice. Whenever we arrive at this condition, then we will get some sort of effective public health work. A physician practicing medicine and doing public health work at the same time is going either to fail as a general practitioner, because he will not have any practice, or will fail as a public health worker, because he will pay attention to his practice and not to his public health work. It is, therefore, absolutely essential to differentiate, and recognize that because a man is

a doctor of medicine he is not a doctor of public health. This must be impressed on the public, as they will not realize it. I am certain that soon a man will not take an M.D. in order to be a doctor of public health. He will study the general medical course perhaps two years, but after that will specialize on public health work, which is a distinct branch of the medical profession, and should not require the degree of M.D. in order to practice it. Men who do public health work in future will be those who specialize on public health. They must have a certain field open to them after graduating, and this field must be made attractive by its emoluments.

In regard to the cooperation of physicians and acts originating with the physicians, in South Carolina the State Board of Health is the entire medical profession of the state, and constituted so by law. We have 750 members of the State Board of Health, and they appoint or elect an executive officer, and a man from each congressional district, making seven in all; so that any act of the State Board of Health in South Carolina, or any bill from the state board, must of necessity arise from the medical profession of the state. They elect this committee, and the committee passes regulations and so forth, and then the physicians themselves do not obey their own committee.

Dr. A. F. Gillihan, Oakland, Calif.: Dr. Hayne did not mention one thing which has forced itself on my attention since I have been in office; that is, as a full-time health officer I can visit other physicians' patients without raising one particle of jealousy on the part of those physicians. This would be absolutely impossible for a part-time health officer in general practice without causing a great deal of animosity, from the very natural fear that he might pick up an occasional patient for himself. The words "to engage in no other occupation" have been used by the speaker. I think this is a good way to express the sentiment. A man doing public health work should not do any other kind of work—should not practice a little on the side. He should not only be occupying his time legally with his position, but he should be morally and actually occupying his whole time with his position. When he is not working at his job he should be dreaming it.

Another condition I desire to mention is the defective administration of public health laws of the state. In California there are some four or five full-time men in charge of public health in municipalities. I am one of these. The State Board of Health can write requesting action on certain matters and I can say "thank you," and throw the communication into the basket. In other words, the State Board of Health of California, as it exists today, has comparatively no authority. It cannot enforce its legislation. I personally do not believe in a health administration consisting of individuals engaged in private practice sitting on a board of

health, either in a city or in a state. I am in accord with the New York method and with the United States Public Health Service—whole-time men and whole-time jobs. I believe public health will be advanced only through an organization in which every member is responsible through proper channels to the head of the department. The state should be the central controlling unit; city and country districts mere subdivisions, amenable directly to state control; and finally the state amenable to the federal service. All employees should be on full time. Public health work should be organized along the lines of preventive medicine and not as today, in California, along the old lines of curative medicine. We should lock the door before the horse is stolen. The method in use today is to lock the door after the horse is stolen; in other words, the disease is here and epidemic before the State Board of Health comes in to correct it.

Dr. Adelaide Brown, San Francisco: In California we have a law that has been passed on by our supreme court, that any city can do better than a state law but it cannot do worse. So if the city of Oakland is doing better than the state law on all those points they do not need the state law to help. Governor Johnson has signed a bill giving to the State Board of Health $30,000 for two years for the establishment of a sanitary engineering department; and this we, as members of the State Board of Health, consider the most fundamental thing that could be done for the public health of the state, because water supply and sewage are two prominent questions to which no consulting engineer has time to devote. Governor Johnson signed a bill for the establishment of a bureau of tuberculosis, including a distribution to the counties of the state, that come up to the standard of the bureau in their care of tuberculous people, a per capita assignment. This will jack up the county hospital; and they need the treatment. The bureau of tuberculosis will control the distribution of that money. The hospital will have to take proper care of its tuberculous people before they will get any money from the state.

A very good vital statistics bill was finally passed, although it had fifty-seven changes before it got through.

An antivivisection bill went into the hands of the governor for signature with a pile of telegrams. It was vetoed on the criticism of it on legal grounds by two prominent men. Those of you who have to face antivivisection legislation ought to learn to attack it as soon as it gets to the legislature, and not wait until it gets to the governor.

We have now a milk law which requires general pasteurization of milk. Its enforcement is a matter of state duty.

We have also passed a law advising the use of the prophylactic treatment of ophthalmia neonatorum, and an appro-

priation for the drugs necessary. We have had also for two years the registration of nurses. Nurses cannot come up for state examination unless the course has been intellectually correct for the young women, and they have been housed correctly, and their course has covered what it should cover and really be an educational course.

The salary of the secretary of the State Board of Health has been increased, which is a recognition for able work. One speaker said that you had to dream public health. I asked a young physician who had a public health position in an adjacent town, a school position, "How many hours do you have to work?" She said, "My salary requires five hours' work a day, and I generally do seven." I think that is practically the proposition. As soon as you limit your day to office hours you cease to be a public health officer. We are taxed by what the work needs and not by any system of hours.

Dr. J. N. Force, Berkeley, Calif.: It is one thing to get the law, and another thing to get it enforced. Here in California we had pretty nearly enough milk law without this new one, but the burden of enforcing the milk law was put on a few inspectors of the state milk bureau and on the local health officers, and of course the milk law was not enforced. I believe with Dr. Kerr thoroughly in the great need of strengthening local health administration. Dr. Gillihan spoke about jealousy of the local health officer. As soon as the local physicians cease to be jealous of the health officer he is beneath contempt, that is, providing that he is engaged in competitive practice. Now, take an illustration of this jealousy. The local health officer says that before children may return to school they should come to his office for a sort of bill of health. Immediately people who are doing pediatrics in the town say, "Oh, the health officer is steering the children down to his office." A man may have the soul of an angel, he may be extremely high-minded in his motives, but just so long as he engages in general practice or even special practice, I maintain he is subject to that criticism, and he is going to get it from somebody. One way apparently of getting round the full-time requirement is to put in a certain working day, and at its close shut down that section of your mind which deals with the public service just as you would shut down your desk. That does not answer the problem, because competitors are going to be just as jealous of a man in the evening as in the morning or between 2 and 4 in regular office hours. It cannot be done on any split basis. The point of view of preventive medicine is entirely different from that of curative medicine. I tried to mix them. I found they would not mix, and I had to give up the practice end of it.

California got as far as having a bill introduced, printed, and referred to the Committee on Public Health and Quarantine, where it was quietly knifed. Some of the features in the bill were that the state should be districted and these districts should have in no case less than 20,000 inhabitants. To develop a population of 20,000 small counties might combine, or a small city might get enough people from the surrounding country. Large counties were not to be subdivided. These small divisions would be inside of the county. There might be deputy district health officers as well as district health officers; and those deputies might either be graduates in medicine or must have a degree in public health from a recognized institution of learning. We put the public health graduate alongside the doctor of medicine with public health training; not saying that he was either better or worse, but saying that there is now a place in the scheme of things for a deputy health officer, not necessarily a medical officer of health; that is still another function; but the health officer having the public health degree.

Dr. William Simpson, San Jose, Calif.: I think I can explain where Dr. Force seems to be at a loss. I am chairman of the legislative committee which at a meeting held in San Francisco decided to ask the withdrawal of the bill until the next meeting of the legislature, for the reason that the bill had not been presented to the committee prior to its introduction into the legislature, and it was then too late to get an opinion from the health officers of the state, as had been agreed at the Del Monte meeting. We were sure it could not pass in the exact form in which it was presented. Every member of the committee was in favor of the full-time health officer, but we felt, as was expressed at the Del Monte meeting, that the men who had been doing the work should have a voice in such important legislation. I am sure no bill can pass unless it allows the counties and districts to make their own appointments. As a part-time health officer I have not had the difficulties with the general practitioner of which many complain, perhaps because our practitioners feel that the health officer is handy to lay things on, and that as a consultant in contagious cases it saves his families an extra fee and relieves him of a trying responsibility.

In California with its cosmopolitan population your inspector's value depends on his knowledge of languages and his ability to explain and give directions in all the dialects there are. The main difficulties of the health officer are in the families in which no physician is called, and here, if he has their confidence, teachers are of great assistance, and probation officers and truant officers valuable in digging out suspected cases. With most parents there is no effort to conceal reportable cases. The child is not sick enough to

have a doctor, but may return to school soon enough to infect the school unless a certificate is required in every case before a pupil is allowed to return. Every minute of every health officer's time should be given to his work, for it is because he is not giving it full time that he not only dreams of his work, but has nightmares as well. In framing laws for this purpose in California, or any other state, however, the power of appointing the local health officer must be left to the local authorities.

DR. T. D. TUTTLE, Seattle: Dr. Hayne spoke of the state having $54,000 and the city $150,000. That on the surface looks badly out of proportion, and undoubtedly is; but I have been trying to find out what health officers are paid in Washington. They will write me, "Our appropriation for public health work in our city or county is $250,000." Beautiful. What does that mean? It means what they call "public health work," garbage collection, sewage disposal, sanitary sewers and all that. It is not public health work. It is some of the branches of public health work, but not as we understand public health work. Our state appropriations are not as big as they appear in a great many places. One of the speakers said that the county health officer service is under the direction of the state board of health, and removable by the state board of health alone. That is nice. We have that in Washington. We proceed to remove some county health officer for failure to perform his duty, and call on the county commissioners to appoint his successor. Dr. Jones is removed. We receive a notice by next mail, "We beg to advise you that we have this day appointed Dr. Jones county health officer." Beautiful theoretically; tommyrot otherwise. Unless your state board of health has the appointing power, to a certain extent, you have absolutely no control. Let your county commissioners appoint if you want to; but let your state board of health say who in that locality is subject to appointment; and let the state board or other authority have the power to remove him, and when removed provide that he cannot be reappointed until his stigma has been removed by your approving power. Then your central body has a certain amount of control over your local body and cannot be rebuffed by the local body. Your central body says, "Mr. Mayor, your health officer has failed to perform his duty. We call on you to remove him." He is removed. "Thank you. We recognize your power to remove. We immediately reappoint him." I was for ten years or more thoroughly opposed to the idea of the nonprofessional health officer. Now I am not. I have been converted absolutely over to the other party. The medical man, the practitioner, is not going to help the health officer to a very great extent in eliminating disease. Why should he? Why should I, a practitioner, devote my time or

a part of my time, or any of my time, we will say, to a town of 300 people without just recompense not only for that time but for the practice that I cut myself out of? What right have the people to ask the practitioner to help them cut out the practitioner's income? They have no right to it and they are not going to get it. Human nature in the physician is the same human nature that we find in the lawyer, the governor, the president or any other politician. I as an individual have no right to ask you as a physician to deprive your children of bread and butter in order that my children should not have the measles.

Dr. Otto P. Geier, Cincinnati: Dr. Kerr in his opening remarks said, "wise legislation, adequate appropriation and efficient health organization" were the three desiderata. From my experience as a volunteer in health work in our city I take it that one of the fundamentals has been omitted, because health administration cannot be efficient, no matter whether we have full-time health service or part-time health service, unless that service is free from political control. I believe that most counties, most cities, most states are suffering from poor health administration from the fact that they are under a miserable political control; where men with good intentions have their arms tied and their eyes blindfolded, rather than that they have not inherently good qualities and are ready to serve the public. In the direction of a full-time health service I believe that every man is made of good enough stuff, so that when he gives all of his time to the work he becomes efficient. Most men are intelligent enough, and the job itself brings enthusiasm with it, so that most men will succeed if they are given the opportunity and paid sufficient so that they can give whole service to the job. As to how to get the health service out of politics, that is a larger question which we can hardly cover; but I do believe that the medical profession is largely responsible for the fact that health service is jeopardized by political control. I find in moving about the country that very few county organizations are definitely and wholly in accord and working in harmony with the local health officer. They know not what he is doing, and they seem to care less. Now it does seem to me that the American Medical Association owes it to itself to evolve some sort of propaganada that will get the county society interested in the subject of health work, and that we are lamentably weak as a national organization in having failed to appreciate how that reflects on the medical profession, and how it lowers the dignity of the profession, not only in its public health work, but in private work. Nothing so brings the medical profession to full recognition in a community as good, efficient local health work. In Cincinnati up to 1909 the political organization had absolute control of our organization.

The people were disinterested. All meat and milk and other inspection work done by that department was miserably done, and we were spending for a city of nearly 400,000, $55,000 a year. Since 1909 it has been under the domination of the medical men of that city. The medical men dictated nominations to the board of health that was created as the result of a pure milk crusade, and since then the board of health is above reproach, and there is not a suggestion of political interference in the board's work. And we have instead of a $55,000 appropriation, $110,000, and that is restricted to strictly health work. I believe with Dr. Kerr that the larger you make the unit the more forceful will be the work, because the more likely you are to get away from political interferences, and petty jealousies; and I think the department gathers a momentum and a dignity because of its size.

Dr. O. B. Nesbit, Gary, Ind.: When I hear health officers talk about lack of cooperation of physicians, I sometimes am inclined to blame the health officer. Unless your public health work originates in your medical society you are going to fail. The health officer who is daily in the newspaper doing his work is not going to get much cooperation from the medical profession. If his campaigns originate in the medical society, and he will get his medical society behind him, he can do anything. A health officer who does not get the medical society in his work is at fault, and can never be an efficient health officer.

Dr. J. W. Kerr, Washington, D. C.: It is a satisfaction to know that the section endorses the employment of the full-time health officer. Personally I think this is the great problem in this country today in so far as public health is concerned. Few of us realize this fact, notwithstanding there is a great national movement going on for the improvement of health and living conditions. The first laws in the country relating to public health provided for the establishment of local health agencies. The first federal law provided for the cooperation of the national government with local authorities. The first state laws delegated the powers of the respective states to localities, enabling them to establish local boards of health. The relation of the local, state, and federal authorities is therefore fixed; and whether we want to or not we have to recognize that relation. The fact that a particular locality is backward in public health matters does not relieve it of responsibility.

In the desire for larger things we have rather lost sight of the fact that over 52 per cent. of the population of this country live in rural sections, that in these sections lie the real public health problems of the present day, and that the need of public officers is greater in rural sections than in our cities—greater because it is not being met. We have not in the past placed enough dependence on local health organiza-

tions. When a society or an individual begins to stir up interest in public health matters, the first thing that is attempted is to establish a commission or agency different from the health department to carry out the work, and the proposed law that is introduced often makes no mention of the local health officer, but aims to establish a new health agency. I think the best example of this is in the tuberculosis laws, of which there has been a mass enacted in the last several years. In many instances the local health officers have not had imposed on them the responsibility for the prevention of tuberculosis, the disease that causes more deaths than any other in the country. This is not the case abroad. In Germany, for instance, they depend on local health organization in local matters. If we in this country expect to advance local health administration and to have it run smoothly so far as the individual is concerned, we must make it our first business to establish a sufficient local organization and give it a living relation with the state and national health organizations.

THE RELATION OF RODENT PLAGUE TO HUMAN INFECTION

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The most essential factor in the control of plague during recent years has been the realization that it is essentially a rodent epizootic. It is true that the literature of plague contains reports of the disease in monkeys, dogs, cats, horses, asses, cattle, sheep, goats, swine, calves, chickens, pigeons, geese, camels, kangaroos, bats, frogs, geckoes, goldfish and carp, but many of these reports are not confirmed by convincing experimental evidence.

Hankin[1] noted an epizootic in monkeys in October, 1897, at Kankhal, and a second simian epizootic was observed at a little later date at Jawallapur. A third series of cases was observed at Gadar in the residency of Bombay in December, 1899. In the second and third simian epizootics the diagnosis was confirmed bacteriologically. Calmette and Salimbeni[2] and the German and Russian plague commissions demonstrated the susceptibility of the brown monkey and the gray monkey to plague. From the collected evidence it may be deduced that while monkeys have a great susceptibility to plague infection, they do not seem to play an important rôle in its propagation under natural conditions.

While there are a number of reports on the susceptibility of the dog to plague infection, a study of them does not warrant the belief that the dog is liable to the disease.

1. Hankin: 30 Ann. Rep. Sanitary Delegate of the United Provinces, 1897.
2. Calmette and Salimbeni: Plague at Oporto, Ann. d. l'Inst. Pasteur, 1899, xiii, 865.

There are a large number of reports on epizootic plague among cats, yet these animals probably play a very unimportant part in the continuance and spread of the disease. Hunter[3] concludes that cats are susceptible to plague and that they suffer from an acute or chronic plague septicemia. He was of the opinion that they infected themselves by eating infected rats.

Horses are moderately susceptible to plague infection when pure cultures are injected into their blood streams in relatively large doses. A careful review of the literature does not disclose an instance in which they suffered from the disease in nature.

Schreyer,[4] K. Matsuo,[5] and Wu Lieu Teh[6] have reported that coolies working in a coal mine and attacked by pneumonic plague infected donkeys with the disease. These are very extraordinary conditions and may be accounted as practically negligible in the course of an ordinary epidemic.

Under natural conditions plague has never been found in bovines. It is true that Simson[7] reported ingestion plague among calves, chickens, pigeons, dogs, geese, sheep and swine, but Bannerman and Kapadia,[8] the German commission,[9] and Hafkin and Lowson[10] have reversed his reports. It is, therefore, logical to conclude that these animals do not play a rôle in plague perpetuation or dissemination.

Since 1899, when Dchurkowski[11] described an infectious disease of camels closely resembling plague, there have been several reports of alleged outbreaks of

3. Hunter, W.: Plague in Cats, Lancet, London, April 22, 1905, p. 1064.
4. Schreyer, O.: Oester-Sanitatswesen, 1911, No. 19.
5. K. Matsuo: The Simultaneous Appearance of Plague in Man and the Ass on the Same Farm, Centralbl. f. Bakteriol., Orig., 1912, lxv, 417.
6. Wu Lieu Teh: International Plague Conference of Mukden, Lancet, London, May 20, 1911.
7. Simson, W. J.: Plague at Hongkong, Brit. Med. Jour., March 28, 1903.
8. Bannerman and Kapadia: The Receptivity of Domestic Animals to Plague, Jour. Hyg., 1908, No. 2.
9. Report of the German Commission on Plague in India, 1899. Arb. a. d. k. Gsndhtsamte, xvi.
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plague in which the camel was the vehicle. The Astrakan commission decided that the camel was susceptible to plague and suggested that these animals might have been the means by which plague has been introduced into countries along the caravan routes. It is doubtful, however, if camels play any great part in the large problem of plague.

The report of the Board of Health of Sydney, 1902, contains a note by Thompson in which he states that in the epidemic of that year seven kangaroos died from plague in the zoological garden at Sydney. This is an isolated instance and without bearing on the general problem.

With regard to bats, the reports are at variance. Gosio,[12] experimenting with the *Vesperugo noctula,* believed that he was able to infect them. On the contrary, Toyama[13] reported these animals as insusceptible.

It seems to be fairly clearly demonstrated that birds in general, and particularly birds which run on the ground, are not susceptible to plague.

The cold-blooded vertebrates, that is, reptiles and batrachians, have been experimented with by Nuttal,[14] Dweill,[15] Furth,[16] and Fukahara,[17] and do not seem susceptible to plague, either by injection or ingestion.

Mention need not be made of the rôle of insects and *Ixodidae* in relation to plague, their part being the transmission of the infection from host to host rather than the function of keeping the disease alive within their own bodies.

The rôle of the rat in the pathogenesis of plague is classical and there is a preponderance of evidence which proves that bubonic plague in man depends

12. Gosio, B.: The Transmissibility of Plague to Bats, Arch. Ital. Biol., 1903, xxxix, No. 1; Bull. d. l'Inst. Pasteur, 1903, p. 784.
13. Toyama: Experimental Studies on Plague, Ztschr. f. med. Mikros., 1909.
14. Nuttal: Centralbl. f. Bakteriol., 1897, xxii, 87.
15. Dweill: Centralbl. f. Bakteriol., 1897, xxii, 382.
16. Furth: Ztschr. f. Hyg. u. Infektionskr., 1907, No. 2, p. 315.
17. Fukahara: Arch. f. Hyg., 1907, lxiii, Part 2.

entirely on the presence of the disease in rodents. It is true that in the pneumonic form of the disease infection occurs directly from man to man without the intermediation of any ectoparasite, but the great bulk of plague is not pneumonic, but bubonic, and it is the rodent species which keeps the disease alive and which carries it from country to country and into the home of man. Plague has been found in nature in the *Mus norvegicus,* the *Mus rattus,* the *Mus alexandrinus,* and the *Mus musculus.* The *Nesocia bandicota,* or bandicot rat; the *Arctomys bobac,* or tarbagan; the *Putorius furo,* or ferret; the *Herpestes griseus,* or mongoose, and the *Neotoma fuscipes,* or brush rat, have all been found susceptible to the disease. All of the spermophiles have proved infectible, as have also the *Cynomys ludoviciana,* or prairie dog, and the *Putorius foetidus,* or skunk. The *Citellus grammurus,* or rock squirrel, and the *Citellus beecheyi,* or ground squirrel, have also proved infectible. The disease has been found in nature in brush rats, skunks and ground squirrels. The overwhelming fact in plague perpetuation and spread is that it is a rodent disease.

It is interesting to study the distribution of human plague cases in their relation to rodent plague cases. It is, of course, impossible to discover every case of rodent plague and on account of the migratory habits of rats it does not necessarily follow that the infection exists in large amounts at every place in which plague rats are taken. On the other hand, the impossibility of determining accurately the movements of human beings renders it difficult at times to discover the exact place at which infection was received. Not infrequently, however, plague rats are found in or near the building in which the human plague victim worked or lived, and the reverse is even more true, that human plague does not occur among people who work and live in rodent-free surroundings. Of the thirty cases of human plague which occurred in New Orleans in

1914, only five were unconnected with rodent plague foci, and in many of them the place at which the infection was received was accurately determined.

The foregoing is the basis of the measures for plague prevention and eradication. Since plague is a rodent disease, if man is isolated from rodents he will not under ordinary circumstances contract the disease, the key to prevention being the separation of man from rats.

It is manifestly impossible to kill all of the rats in a given community, much less in a whole country, or the entire world. If their migrations can be controlled, if they can be excluded from the places in which man lives and works, the maximum result has been accomplished. Wide migration of rats occurs largely by ships, a relatively very small number traveling overland by trains. The frequent periodic fumigation of ships, the breasting-off and rat-guarding of nonfumigated vessels, and the inspection of outgoing and incoming cargoes will, to a considerable degree, control wide rodent migration. The ratproofing of buildings used by man for any purpose whatsoever will keep rodents out of intimate association with man. For this purpose impervious material, such as concrete, brick, stone, and tile, have their architectural application. During the presence of a plague epizootic the extermination of rats by traps, poisons, and separation from food supply so diminishes the density of the rodent population as to limit the spread of the disease from the sick to the well, and thus the disease automatically dies out for want of infectible material. This in effect is the dilution of the infectible material. At the same time the laboratory examination of captured rodents affords an accurate guide as to the centers of rodent infection and permits the application of intensive preventive methods so that the disease may be stamped out among rats before opportunity has occurred for it to be transmitted to man.

In the presence of an epidemic, every measure which will protect man should be taken. Among these is immunization against the disease after the method of Haffkine. This is of doubtful applicability in American cities. It could never be made mandatory, and those persons who volunteer for such inoculations do not form the class which is most liable to receive the infection. This method has not proved useful in large eradicative measures, it having been found more practicable to limit the operations to rodent extermination and the exclusion of this species from the home of man.

ABSTRACT OF DISCUSSION

Dr. William C. Hassler, San Francisco: The paper gives us a very clear insight into the animals which are carriers of this disease. The point that I was particularly interested in was the matter of prophylaxis. I was the first one to receive a dose of Haffkine serum here in 1900. I was then acting chief sanitary inspector of the health department. We tried to impress its harmlessness on the Chinese population here whom we then had in quarantine. It was all right as long as they saw us getting the dose, but a few days later when we came to demonstrate the harmlessness of it, and our arms were swollen about the bigness of a goose egg, we had great difficulty in inducing them to submit to the measure. It would not work and we had to adopt other measures. Nevertheless, it is a safeguard, and one which can be used and has its value under certain conditions.

Dr. W. C. Rucker, Washington, D. C.: It may be of interest to this section to learn a little bit about the results of the campaign against plague in New Orleans. New Orleans is today 75 per cent. rat-proof. The probabilities are that there will be 15 per cent. of the city which cannot be rat-proof for several years. There therefore remains only 10 per cent. to be done. This is being accomplished. Up to the present we have captured in the traps alone over 375,000 rodents. They are being taken at the rate of about 1,100 per day. Of these, 247 have been found infected, the last one having occurred on June 11. We are now getting plague rats at the rate of one out of over 21,000. They uniformly come from buildings and premises which are not rat-proof. There were thirty human cases, of which nine patients died. The probabilities are that had it been possible to give all of those patients the serum treatment very early and in large doses, the mortality would have been very much lower. The epidemic began in the early part of June, and the last

human case occurred Oct. 4, 1914. An extensive out-going quarantine was established in order that the port might be kept open. Vessels were fumigated with either sulphur or carbon monoxid or hydrocyanic gas in order that they might leave freely. Every package of freight was inspected before it was put on the ship. Every freight car that left the city was inspected to determine its rat-proof and free condition; all freight was inspected before being loaded, and was then loaded under the eye of an inspector. The car was then sealed with a lead seal bearing some device, and there was a large sign posted on the side of the car, "This car certified as to its rat-proof and free condition providing the seal remains unbroken." As a result, freight, both by maritime and overland routes, moved freely and continuously to and from the city of New Orleans. In this work we rat-proofed some 30,000 cars alone; and in the fumigation of ships we consumed for the carbon monoxid fumigation about a million and a half pounds of coke. There was established early an inspection of the dead in order that all cases might be found, and this inspection continued until it was very clearly demonstrated that no more human plague existed. All of the rats were identified as to sex and species; and in this connection I desire to point out a very interesting gage on the value of your work. If you are carrying on a rodent extermination campaign, it is interesting to have a check by means of which you may know whether you are really killing rats. The trapping of mice in a campaign is entirely incidental. You do not aim to catch mice; and in the beginning of the campaign it will be found that the number of the true rats will be very high, something like 91 per cent. of the entire catch. If you will plot those on a chart you will find, if your work is successful, that there is a steady fall in the number of true rats, and that there is a steady rise in the number of mice, until you come to a point, as we did away along last December, where the mouse line has passed and far exceeds the rat line. In other words, you have been killing off, if your work is successful, the natural enemies of the mouse, and the mouse is therefore able to come out and get into your traps. We have in our exhibit at the exposition a very good chart showing this very simple point.

My paper, I feel, has been trite, but I think that it is a wise thing to tell the story over and over again, that so long as you have rats you are liable to have rodent infection, and that so long as you have rodent infection you are liable to have human infection and plague.

A NOTE CONCERNING THE FAVORABLE INFLUENCE OF GLUCOSE ON THE GROWTH OF ACID-FASTS

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It was observed that an acid-fast culture ("Peter") which had been isolated from a leprous nodule by using symbiotic bacteria (cholera vibrios), grew luxuriantly on agar containing grape sugar, while on plain agar multiplication was scarcely visible, and on glycerin agar the growth was very scanty as compared with the majority of our cultures of acid-fasts.

After having determined by repeated observations that there was no doubt about the influence of glucose on the multiplication of this organism, an experiment was carried out to determine what amount of the carbohydrate was required to exert a favorable influence on several slow-growing acid-fasts including the culture "Peter." Glucose, to form the percentages shown in the following table, was added to agar made in the ordinary way with meat extract. The readings were made after nine days and gave the results in Table 1; the best growth of each culture being indicated by 10.

As the table shows, one part of grape sugar in 1,000 of the finished nutrient agar had a pronounced influence.

The results where the medium was a liquid (broth) were not so striking, and differences were not so readily estimated as when a solid medium was used; however, they showed that glucose promotes the multiplication of certain acid-fasts under these conditions.

For purposes of comparison, glycerin broth was also used. The glycerin broth and glucose broth were made from the same lot of meat extract broth which served as the plain broth of the experiment. The readings, which were made after twenty-two days, are shown in Table 2; two of the cultures, it will be observed, grew as well on glycerin broth as on that containing glucose:

TABLE 1.—PERCENTAGES OF GLUCOSE REQUIRED TO PROMOTE GROWTH OF ACID-FASTS

Culture	Percentage of Glucose			P. A. (Control)
	1 per Cent.	0.5 per Cent.	0.1 per Cent.	
Peter	10	9	8	Trace
72	10	10	8	1
H	10	10	5	1
F	10	8	5	2
Barry	10	7	7	3

In order to ascertain what influence other sugars would have, a number were tested together with dextrin and glycerin. The mediums were sterilized by the fractional method. The results showed that glucose and levulose seemed to have a more favorable influence on the growth of the acid-fasts employed than did

TABLE 2.—CONTRASTING CULTURES ON PLAIN, GLYCERIN, AND GLUCOSE BROTH

Cultures	Plain	Glycerin, 5 per Cent.	Glucose, 1 per Cent.
Peter	1	3	10
72	1	2	10
Barry	3	10	10
F	3	10	10

saccharose, lactose, galactose, maltose, or dextrin, using 1 per cent. in each case. A combination of 0.5 per cent. of levulose and the same proportion of glucose gave particularly favorable results, as is shown by Table 3:

As irregularities sometimes occur when a culture is carried directly from the growth on solid mediums, due doubtless to the varying number of viable organ-

isms that remain on the platinum wire, several experiments were made in which the growth on an agar slant was emulsified with sterile salt solution (0.9 per cent.) and one loopful of the suspension carried to the new medium. To further eliminate accidental differences,

TABLE 3.—CULTURES WITH VARIOUS MEDIUMS INCLUDING A COMBINATION OF LEVULOSE AND GLUCOSE

Cultures	Plain	Glycerin, 5 per Cent.	Glucose, 1 per Cent.	Saccharose, 1 per Cent.	Lactose, 1 per Cent.	Galactose, 1 per Cent.	Levulose, 1 per Cent.	Maltose, 1 per Cent.	Dextrin, 1 per Cent.	Glucose, 0.5% and Levulose, 0.5%
Peter	2	4	10	1	1	2	2	2	3	10
G	2	9	10	4	4	5	9	4	8	8
72	4	—	3	7	2	8	10	7	10	10
Apo	0	3	10	1	1	3	7	1	3	10
26	1	5	3	0	0	5	3	3	2	10
84	2	10	10	2	2	4	C	3	3	10
Rat Leprosy	2	—	3	3	0	3	10	1	C	C

0, no visible growth; —, not planted; C, contaminated tube.

five tubes of each medium were inoculated from the suspensions. The growth of each culture was remarkably uniform on each medium. The results of one of these plantings are shown in Table 4:

TABLE 4.—GROWTHS FROM EMULSIONS

Culture	Plain Agar	Glycerin Agar	Glucose Agar
H	1	10	8
G	Trace	10	10
Apo	Trace	5	10
84	5	5	10
26	5	8	10
148	1	7	10

The growths of certain well-known acid-fasts were compared on the glucose agar, glycerin agar, and plain agar, with results that may be summarized briefly as follows. The margarin organisms grew about as well on one medium as on another. Friedman's tubercle culture, said to be from the turtle, and avian tubercu-

losis cultures grew better on glycerin agar than on the glucose agar. Each of the latter gave only a trace of growth on plain agar.

A single experiment seemed to show that the addition of glucose to Dorset's egg medium did not improve it as an agent for cultivating the human tubercle bacillus.

The culture "Peter" growing vigorously on glucose agar, when transferred to plain agar, grew as poorly as cultures that had never been on the carbohydrate medium. Throughout the work the transplants were made from plain agar growths, and the cultures were all kept at 37 C.

In all of the experiments, with the single exception noted, the glucose agar, glycerin agar and plain agar were sterilized in the autoclave at 15 pounds for twenty minutes. The others were sterilized in the Arnold sterilizer for three successive days. Kahlbaum's glucose was used in most of the experiments, but on one occasion when commercial glucose (powder) was used the results were the same. The other sugars all bore the Kahlbaum label. The glycerin was Price's product. The dextrin the commercial grade.

ABSTRACT OF DISCUSSION

Dr. C. C. Bass, New Orleans: The idea occurred to me, as I heard Dr. McCoy's paper, that possibly the glucose furnishes a source of energy or a source of carbohydrate to the living cell or the living plant, as the tubercle bacillus probably is. In the cultivation of malaria plasmodia it is just as essential to furnish them glucose as anything else. They cannot live without glucose for any great length of time. We believe we have recently determined that malaria plasmodia actually consume the dextrose; that it serves as food for the parasite.

Dr. William C. Hassler, San Francisco: I would like to ask Dr. McCoy if he thinks the glucose has any effect on the oxygen available to the germ while it is growing there, instead of supplying something to the germ.

Dr. G. W. McCoy, Honolulu: That we have not worked out.

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